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AND

DR. C. HESS
OF BERLIN

AND

DR. W. A. HOLDEN
OF NEW YORK

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The Archives of Ophthalmology is a bi-monthly journal, published in annual volumes of about six hundred pages each, extensively illustrated with cuts in the text, half-tone text plates, and lithographic plates, many in colors.

About three quarters of the space is devoted to original papers, and the remaining quarter to a systematic report on the progress of ophthalmology, and to reports of societies, book reviews, and miscellaneous notes, all of it original.

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VI.—**Les Borgnes de la Guerre (The One-Eyed in War.)** By Dr. G. VALOIS Paris, 1918.

ARCHIVES OF OPHTHALMOLOGY.

PLASTIC SURGERY OF THE EYELIDS AFTER WAR INJURIES.

BY T. HARRISON BUTLER, M.D., OF BIRMINGHAM (ENGLAND).

(With six illustrations on Text-Plate IV.)

BEFORE the war injuries of the lids calling for extensive plastic surgery were not common, and few ophthalmic surgeons obtained sufficient material to become really proficient in this branch of the art. The war has altered this state of affairs, and great progress has been made; old methods have been perfected and new ones have been called into being. For the past three years the top story at the Birmingham Eye Hospital has been allotted to wounded soldiers, a large number of plastic operations have been performed; and considerable experience has been gained. Cases are now operated upon with more certain knowledge of the correct procedure to adopt and of the detailed technique necessary to obtain a successful result than was possible earlier in the war. At that time there was a decided lack of boldness, and sometimes the choice of a method inadequate in its scope led to partial failure, followed by a second operation, whereas a more drastic attack would have given immediate success. As an example: a soldier in which a lower lid was slightly drawn down by scar tissue was operated upon by a V Y, or Wharton Jones, procedure. The result was only partial and the scarring more extensive than in another exactly similar deformity treated by turning down a pedunculated flap from the temple.

The cases fall naturally under two heads: deformities and

malposition of the lids caused by wounds and by contracting scar tissue; and actual loss, partial or complete, of one or both lids. The operations which we employ to remedy these defects are of three types: the use of pedunculated flaps; V Y and sliding operations; and finally grafting. In the large majority of war injuries we now always use a pedunculated flap, but when the deformity has been produced by burns a flap cannot always be obtained, and then we fall back upon grafting. The degree of success gained is largely influenced by the state of the lid edges. Given an uninjured margin a satisfactory lid should be obtained by a well planned attack, but if the lid margin be absent or seriously damaged, then the final result is apt to be imperfect.

The object of these plastic operations is generally a cosmetic one, to remove deformity with the minimum scarring, and to enable an artificial eye to be comfortably worn. It is often impossible to achieve success in one operation; often several are necessary, and both surgeon and patient need much patience before the defect yields to a course of treatment in which each intervention is designed to lead to the final adjustment. When large portions of the lids have disappeared and much fibrous tissue has to be cut away the new lid must be built up by successive stages, but with practice more can be done at each sitting, and fewer operations are necessary. The V Y method has proved unsuitable except in the most trivial cases. Although apparently less severe than the flap method yet actually in practice it leaves more visible cicatrices, and generally fails to cure the malposition of the eyelid. We now rarely choose this operation, which is often called the Wharton Jones method. The Wolfe or whole-skin graft is sometimes very successful but it is uncertain, and has we think been largely superseded by the new Esser epithelial outlay plan which we shall describe later.

Pedunculated flaps, generally cut from the cheek or the temple, have given uniformly good results, and we now employ them in preference to any other method whenever the conditions are favorable. We have found that even apparently trivial displacements of the lids are more satisfactorily treated by flaps than by procedures which seem to be less formidable. In all but the slightest deformities a pedunculated flap will

No. 1.—A photograph showing the result obtained by Kuhnt's modification of the V Y operation. As the result of a shrapnel wound a large portion of the malar bone had been carried away, leaving a depressed scar to which the lower lid was adherent. The lid was drawn down nearly an inch below its normal position. The cavity was filled with fat in which a certain amount of suppuration took place, with the result that the initial operation was a partial failure. A pedunculated flap turned down from the temple completed the cure.

Nos. 2 and 3.—These photographs show the result obtained by transplanting half of the left eyebrow onto the right side. The right upper lid was drawn up and has been replaced by the use of a pedunculated flap from the temple. The lower lid, which was drawn down, has been replaced by the use of an Esser graft. The depression and the thickened edges alluded to in the text are well shown. The second photograph was taken three weeks after the brow operation.

No. 4.—As the result of shrapnel injuries this soldier had lost the inner half of his right eyelid. It was replaced by a pedunculated flap from the temple which included part of the eyebrow. The hairs were then utilized to form the eyelashes as described in the text.

Nos. 5 and 6.—Two photographs showing the result obtained by successive flap operations, after a course of treatment lasting nine months. The two photographs show the appearance before and after treatment.

ILLUSTRATING DR. BUTLER'S ARTICLE ON "PLASTIC SURGERY OF THE EYELIDS AFTER WAR INJURIES."

FIG. 1.

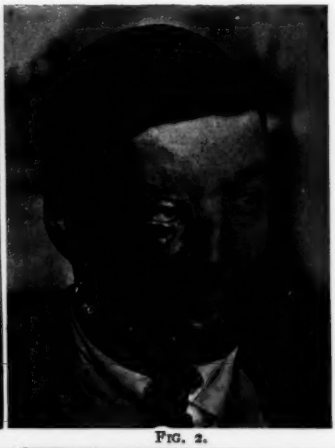


FIG. 2.

FIG. 3.

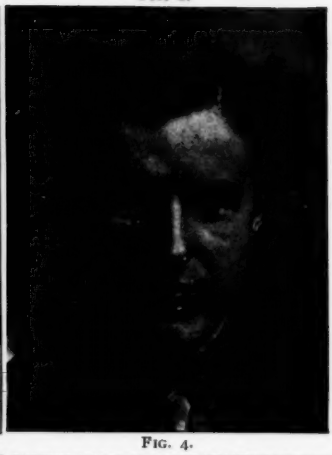


FIG. 4.

FIG. 5.

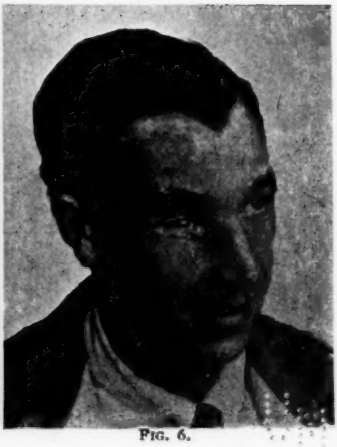


FIG. 6.

remedy the defect with certainty and without leaving unlovely scars. The first essential in all plastic work is to avoid tension, and when this is not possible to reduce it to a minimum, and to transfer the tension to a spot where aseptic healing is more certain than it is at the actual seat of injury. A V Y operation involves considerable tension at the site of the deformity, and close to the lid edges. A little suppuration is more likely to occur here than on the temple; it may vitiate the result and the resulting cicatrix will be bad and in an exposed situation. If some suppuration takes place along the edge of the transplanted flap the final result is not prejudiced. The flap will always be taken from the temple unless local conditions forbid: for example, if, as in our last case, the lower lid be drawn down and a scar run outwards from the external canthus, then an upward flap would have a cicatrix across its base and its blood supply would be quite inadequate. Here we are compelled to take a flap from the cheek. Again if both lids be displaced we cut two flaps, one from the cheek, and the other from the temple. The objection to the cheek flap is that it leaves a scar, which, however, is rarely objectionable. The scar from the temple flap must be kept close to the outer canthus. It then lies in wrinkled skin and soon becomes invisible.

The technique for this operation is quite simple. An incision is made below or above the edge of the displaced lid and all adhesions and bands are freely separated. Often they run deeply into the orbit. The skin is undermined till the lid lies easily in its normal position. The length and width of the defect are now measured with compasses, and a suitable flap marked out. It starts from the outer edge of the wound and extends upwards for the same length as the wound.

The external incision is not carried as low down as the internal, the part left below being as long as the flap is wide. The flap is now dissected up first with scalpel and then with scissors till it rotates freely without any wrinkle at the turn. The base should be separated as little as possible to leave a good blood supply. The end of the flap must be left blunt and the depth of the dissection is just as much as comes naturally. We use catgut sutures. The flap will be found to be firmly healed in place in about a week.

In cases where there is a depressed scar caused by loss of

bone, the cavity left when all the redundant fibrous tissue has been cut away can be filled with fat from the buttocks. Originally we inserted the fat when the flap was made, but the fat is liable to suppurate, and we think that it is a better plan to insert it at a subsequent operation. Suppuration in the fat does not imply that it fails in its object; it becomes changed into a fibrous mass which more or less occupies the cavity. As a matter of fact a simple flap operation rarely if ever suppurates but practically always unites by first intention. When the deformity is situated at the inner aspect of the lids, for example the large defect left by the incision of a rodent ulcer, flaps can be cut from the nose and forehead, and it is surprising how soon the scars become almost invisible.

After two years' constant use of the pedunculated flap method we conclude that the operation is easy, that healing is certain, that the cosmetic effect is good, and that there are no obvious disadvantages.

A modification enables us to replace the eyebrow and the eyelashes. In a recent case whose photograph we are able to reproduce the right eyebrow was completely burnt off, leaving a smooth surface of scar tissue. The upper lid was drawn up and the lower lid down, causing complete lagophthalmos. The left eyebrow was thick and bushy. The upper lid was brought down by a pedunculated flap which healed in without any obvious scar or difference in skin texture. The lower lid was brought up by an Esser epithelial outlay which still has a parchment appearance, and is wrinkled at the edges, and somewhat depressed centrally. The patient, a discharged soldier with nephritis, was very pleased with the result, but wished me to make him a new eyebrow. The left brow was shaved and accurately split along its whole extent, and a flap cut a quarter of an inch wide which comprised half the eyebrow. This was cut broader towards the base which was placed over the nose, and the flap was rotated through 90 degrees and placed in a bed prepared for it over the left eye. A mistake was made. The incision was made where the brow should be, but in order to increase the effect of the original graft the skin was undermined only downwards in complete forgetfulness that this process would cause the lower lid to lie too low, as indeed it does.

The effect, however, is excellent. A fortnight later, under local anæsthesia, the base of the flap was excised to remove the hair from above the nose where it was not wanted. This plan can always be employed when there is a good brow to divide. If the brow is not well marked, the operation is not necessary for the absence of the other brow is not so obvious.

Eyelashes present more difficulty, but when the conditions help they can be manufactured from the brow. We show the effect produced in a second photograph.

This soldier had lost the inner half of the original eyelid including the edge. The defect was supplied by a flap from the temple which included the outer tip of the eyebrow. It is obvious that when the flap was placed horizontally in position the strip of brow-bearing skin came to lie vertically. After a month this strip was cut as a secondary flap with its base near the lid margin, and was rotated to lie along the lid edge in such wise that the hairs pointed downwards. It will be seen that the illusion is complete, and, as the eye is a glass one, any distichiasis effect is harmless. The soldier is immensely satisfied with his present appearance, which at a short distance is normal. This process can be utilized in any case with a suitable brow. Part of the brow is split, a flap turned vertically, and later rotated upon its lower extremity till it lies in situ where required.

The Esser epithelial outlay method is still in its infancy; we have only used it during the past six months, but we have had sufficient experience to know that it has immense possibilities in suitable situations, and that it comes to our rescue when other methods are inadmissible. The chief sphere of the operation is undoubtedly in cases of severe burning, when the surrounding skin is parchment-like, and flaps cannot be obtained. We have used it in two such cases, among many others, both epileptics who had fallen into the fire and literally roasted! In one of them the result has been most gratifying from the cosmetic point of view, the other was too badly deformed to admit of much improvement in appearance, but the cure of double lagophthalmos, and the liberation of scars round the mouth have greatly added to the comfort of the sufferer.

We are fully conscious that much more practice and experi-

ence is necessary to gain the fullest advantage from this almost epoch-making device.

The advantages are three: the graft invariably "takes," because it is subject to pressure against the surface to which it will adhere, and it is kept warm and moist. Again the method allows of free liberation of the contracted area, and it can be used when older procedures cannot be applied.

The operation seems to have the disadvantage that the cosmetic effect is mediocre; the graft has a wrinkled parchment-like appearance, and some depression remains. Again the edges are apt to be hard and obvious and call for subsequent excision. This is well shown in photograph No. 1. This graft could be improved, but the man had already had three or four operations, and as he was frequently in bed with a rise of temperature, and had casts and albumin in his urine, it has so far been left as it is.

The Esser operation is carried out as follows:

An incision is made along the lid edge in the manner already described above. The skin is undermined in such wise that a pouch is formed. A piece of dental "stent" or "dental molding wax" is warmed and molded till it fits into the pouch easily. An epithelial skin graft is now sewn round the stent, which is put into the pouch, and the edges of the pouch are united with four or five sutures. In from a week to ten days the wound opens spontaneously or is opened, and the stent is removed. The pouch will be found to be lined with epithelium. It gradually unfolds, liberating the contracted lid. The actual details of the operation are important. Dental "stent" is spoiled by boiling but it is still good enough for our purpose. We boil it in an enamel basin and with sterilized fingers mold it to size and lay it down in a sterilized towel placed on a table provided with a chair of suitable height. On the table are placed needles threaded with thin catgut, needle holder, and conjunctival forceps. Molding wax is easier to use, but it cannot be boiled because it melts to a film which floats upon the water. It must be softened in warm water, molded to shape, and sterilized by immersion in an aqueous solution of bioxide of mercury 1:500. An alcoholic solution tends to dissolve the wax.

The graft, which must be about 1¼ inches square, is cut

from the flexor surface of the forearm, arm, or from the inner aspect of the thigh. The arm must be flexed or the muscles will stand out and the cut will be too deep. The surface is made flat by the use of two thin boards with well squared edges, each about ¼ inch thick. A sharp razor is employed, a stream of saline being poured over its edge as it cuts. The graft must be thin and should not include any subcutaneous tissue. The graft is now laid on the sterilized towel and spread out with the raw surface downwards. The stent is placed on it and the graft sewn round it with fine catgut. The conjunctival forceps are convenient for this manipulation. The line of sutures must be placed so that they lie towards the outside when the stent is placed in the pouch.

When the unfolding is complete it may be necessary to excise the edges which sometimes remain hard and raised. It is necessary to make the original incision sufficiently long to allow the pouch to flatten out easily, otherwise a pit will persist, and a second operation will be necessary to unfold it. When the graft has to be placed vertically at the inner canthus a secondary intervention is generally called for to complete the unfolding.

The Esser technique is perfectly easy to acquire, but experience is needed to determine the most suitable shape for the stent. A flat crescent seems best for a mold placed above or below the lids. Stents with a round cross section tend to deep pits with incomplete unfolding. We have described an epithelial "outlay"; an "inlay" is used to place grafts in the conjunctiva to remedy contracted sockets, but this is outside the scope of this paper.

Immediate grafting of burns should be employed to prevent contraction. When the burnt surface has become clean and is covered with healthy granulations an epithelial graft is cut as described above and carefully spread over the raw area. It is now thickly covered with vaseline; then with a piece of oiled silk; and again with vaseline. A dressing is applied *and not touched for from ten days to a fortnight.* When the dressing is removed the graft should have grown, and be almost invisible.

This treatment should be adopted far more often than it is. We have said nothing about the Wolfe or whole-skin graft

because the technique is well known. We have generally sewn these grafts in place and covered them with a piece of gold gauze, which is sewn down to the surrounding skin. It is essential to obtain pressure upon the graft to keep it firmly and evenly applied in place. Our results have not been equal to those yielded by the Esser method. Not infrequently the whole-graft sloughs and the operation must be repeated.

Plastic surgery is most fascinating, and the actual manipulations are easy. The sole difficulty lies in the plan, which calls for careful thought; it is in this respect that experience tells. We think that it is a mistake to try to do too much at one sitting. A serious deformity, especially when there is loss of tissue, is frequently best approached by stages. One soldier was in the Eye Hospital for nine months and underwent ten operations. At first the case seemed almost hopeless, but step by step the lids were built up, till eventually an artificial eye could be worn, and he was not ashamed of his appearance. It is shown in photographs 5 and 6.

INJURIES OF THE SUPERIOR OBLIQUE MUSCLE—REPORT OF CASE—TREATMENT.[1]

By ALBERT C. SNELL, M.D., Rochester, N. Y.

(With four illustrations in the text.)

FROM a review of the literature, cases of isolated traumatic paralysis and also cases of direct injury to the superior oblique muscle are discovered to be of rare occurrence. Therefore, I trust that a report of a case of direct traumatism to the trochlea of the superior oblique, in which it was completely separated from its bony attachment, will be of interest.

The traumatic cases, in which the superior oblique disturbance was associated with disturbance of other ocular muscles, especially with the oculomotor and the abducens, were found to be more numerous. This latter fact is explained on anatomical grounds for the three nerves supplying these muscles pass together through the superior orbital fissure and the origins of their nuclei are close together. Furthermore, traumatic motor disturbances of ocular muscles are most often associated with injuries to the head where central lesions and also fractures and injuries involving the superior orbital fissure are common. The relative frequency of traumatic involvement of the trochlearis is shown by Müller who has reported forty-nine cases of traumatic ocular palsy. Thirty-four of these were due to blows on the head or to head injury; eighteen of this number involved the trochlearis; and of these only two were direct muscle injuries.

In a search through the literature I have been able to find recorded forty-two cases of isolated traumatic disturbance of the motility of the superior oblique (including the eighteen

[1] Read before the Buffalo Ophthalmological Club, December 12, 1918.

reported by Müller). It was found difficult to separate the cases into classes which involved only the tendon, or the muscle, or the pulley, as most of them were mixed or not accurately determined. Cases involving these three structures numbered twenty-one. In thirteen of the cases the injury was in the region of the pulley. In one case, that of Greven, the trochlea, was completely torn away. A case in which the trochlea or tendon was injured during an operation on the lacrymal duct is reported by Geisler. In eight cases the injury involved the muscle or tendon. Two cases reported by Quintela followed Luc's method of operating on the frontal sinus. With the exception of these cases caused by operation on the sinuses and the one on the lacrymal duct, the injury to the muscle, tendon, or pulley was due to the entrance of an object between the globe and the bony orbit.

Twenty-one of all the reported cases, or fifty (50%) per cent., were due to severe injuries to head or face where the lesion was either at the base or involved the motor center. The lesions in this class were due either to fracture, usually along the course of the nerve, or to pressure caused by hemorrhage or inflammatory exudate, located centrally.

Out of the total forty-two cases, twenty-five made perfect or at least very satisfactory recoveries within a period of fourteen days to eighteen months, without operation. In nine cases operations were performed on the superior rectus muscle; in eight cases recovery was not entirely satisfactory, but no operation was performed.

The major part of the cases which made satisfactory recoveries without surgical interference were classed among those having basal or cortical lesions. This demonstrated that the cause of the disturbed function was probably due either to hemorrhage or exudate along the course of the nerve or centrally, and that this promptly absorbed relieving pressure. A small percentage of spontaneous recoveries occurred among those in which the injury involved the muscle or its tendon. In these cases the muscle, or trochlea, or tendon probably was not completely severed, so that injured and bruised tissue became united, at least in part, by the usual inflammatory processes. Compensation of synergistic muscles must also be considered as an important factor in these recoveries. Wer-

theim, who reports a complete recovery in a case in which both the belly of the superior rectus and the tendon of the superior oblique, posterior to the trochlea, were lacerated by an injury, ascribes the cure to the fact that the superior rectus as an elevator was weakened to the same degree as the superior oblique as a depressor. Consequently, he suggests as a treatment for paralysis of the trochlearis, a tenotomy of the superior rectus. This has been the operation of choice for traumatic disturbance of the superior oblique's function. Uchida suggests an advancement of the inferior rectus for overcoming the diplopia due to paralysis of superior oblique. In my review of the reported cases I did not find any case of traumatic disturbance of the superior oblique in which a tenotomy of the inferior oblique was performed.

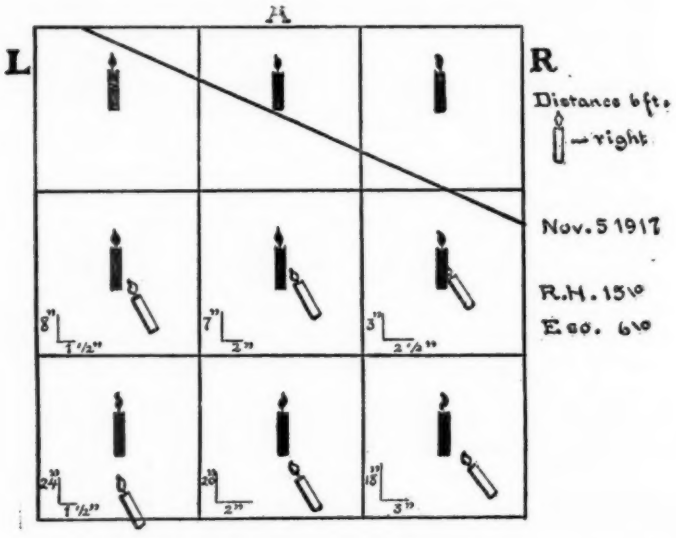
REPORT OF CASE.

Mr. John Frank, twenty-eight years of age, a skilled mechanic, consulted me on October 2, 1917. At this time he stated that ten days previous he had fallen on an oil can, the spout striking him in the right eye and causing a wound in the upper lid; that since this accident his vision has been considerably disturbed; and that prior to the accident his sight had always been good.

On inspection there were found a scar one fourth of an inch in length, parallel with and slightly below the supra-orbital brim, situated at the center of the inner third, a subconjunctival hemorrhage extending from inner edge of the limbus to the canthus, pupils which were active and responded promptly and equally to light stimulus, and vision in each eye of $\frac{20}{20}$. The ophthalmoscopic examination showed all intraocular structures to be perfectly healthy and normal. Patient carried the right side of his head higher with a decided slant or tilt and with face looking toward the right. There was limited movement in O. D. downward. Diplopia was found in the lower field and became most marked when looking down and strongly to the left. Fusion was maintained for all distant objects. In the primary position with tilt corrected, Maddox's red rod test revealed esophoria of four (4°) degrees and right hyperphoria of twelve (12°) degrees. The position of the injury, the fact that his double vision increased on looking down and toward the left, right image being lower, that the eye was in adduction, and that the false image was tilted toward the left, established a diagnosis of motor disturbance of the superior

oblique. Charts of the area of double vision were frequently made and these confirmed our diagnosis.

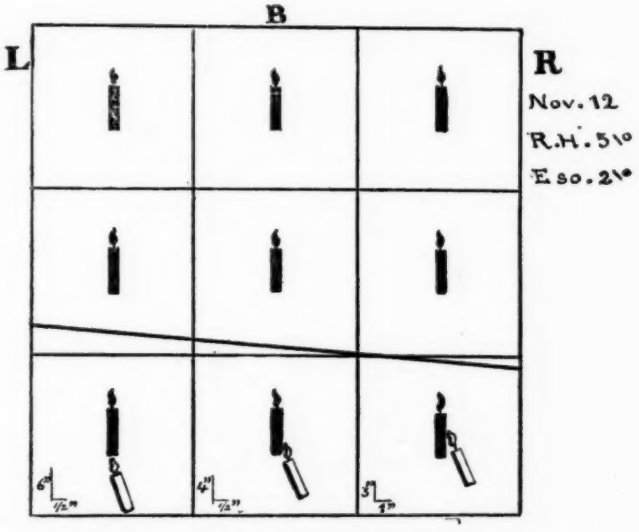
Patient was under observation from October 2d to the 22d, during which time the swelling and ecchymosis disappeared, but the double vision became more annoying. The double vision, which did not incapacitate him during the first two weeks following the accident, became now so extremely annoying that he was unable to follow his usual occupation, that of running a large, complicated machine. The operation required the accurate judging of distances



and perfect orientation. He had several narrow escapes from injuring his hands in the moving machinery and finally did receive an accident which compelled him to give up the work.

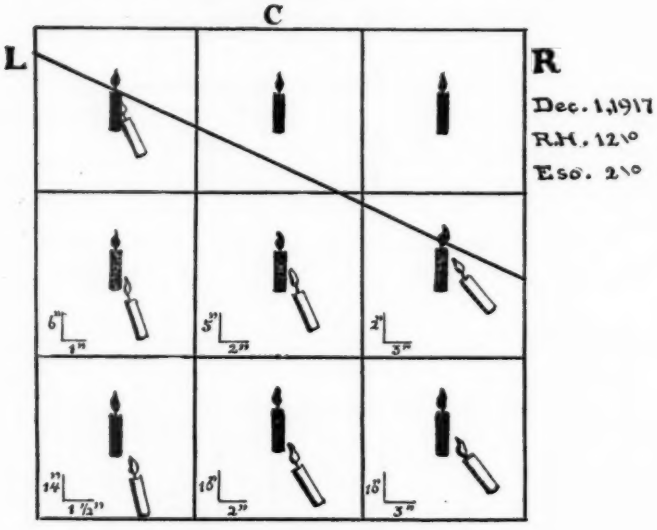
On October 22d, under local anæsthesia, I made an incision near the area of the wound and exposed the superior oblique muscle. I undertook the operation believing that this muscle was probably torn and lacerated to such an extent that it was impossible for nature to reunite the severed parts, and I thought that it might be possible for me to suture them together. The tendon of the muscle and its insertion into the eyeball were easily exposed and the tendon was then drawn forward on a strabismus hook. I found

that neither the tendon nor the muscle was injured or severed, the pull of the muscle being decidedly felt when the patient looked down, but the pulley's attachment was completely torn away. I was not able to isolate the pulley or to place the muscle tendon in its proper position. Therefore, in the neighborhood of the trochlea I attempted to gather some tissue by a sort of purse-string method using catgut and tying all together, hoping that the tendon of the muscle might become fastened in some scar tissue and make an artificial trochlea. This of course was an entire failure.



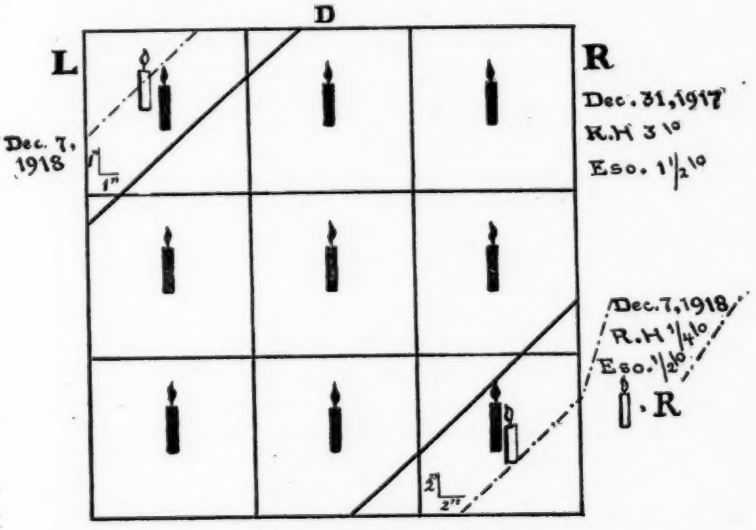
On November 8th, a tenotomy of the right superior rectus was done, cutting the central fibers completely but leaving the peripheral attachments intact and vigorously stretching the cut muscle. For several days following this operation there was considerable improvement in the area of single vision and there was less phoria. On November 12th, four days after the tenotomy of the superior rectus, marked diplopia persisted in the entire lower third of the motor field, but fusion was possible in the upper two thirds and for distant objects. With head straight and level we found two (2°) degrees of esophoria and five right hyperphoria, and in the lower left motor area the vertical displacement was between six and eight inches, candle at six feet distance.

By December 1st we had lost nearly all of this gain, the area and degree of diplopia being only slightly better than that of November 5th, esophoria being three (3°) degrees, right hyperphoria twelve (12°) degrees. The persistent diplopia in the lower field made it impossible for him to return to his work, which fact meant a great loss in his earning ability. The slight gain of fusion in the upper motor area was of no real economic value.



In 1915 I had the pleasure of hearing Dr. Posey's paper which he read before the American Ophthalmological Society on "Tenotomy of the Inferior Oblique Muscle." A further study of his article convinced me that this should be the operation of choice for this case. One of the indications for tenotomy of the inferior oblique was pointed out to be "spasm or over-action of this muscle following paralysis of the superior oblique." In this case there was overaction of the inferior oblique, and the tearing away of the trochlea produced a condition simulating paralysis. Therefore, on December 17, 1917, I performed a tenotomy of the inferior oblique of the same side, following Posey's technique, the muscle being freely and completely divided. The effect was immediate. Motor charts showing the area of double vision were made on December 18, 20, 21, 31, 1917. On all of these

occasions areas of double vision were found to exist in the upper left and lower right squares only, single vision being maintained in all other parts of the field. In the left upper area the images were separated one inch both vertically and horizontally and were crossed. The right image was the higher, indicating an overaction of left superior rectus and left inferior oblique. In the right lower area the images were homonymous and were separated both vertically and horizontally two inches, the right image being the lower, indicated an overaction of left superior oblique. The



diplopia in these motor areas caused no annoyance since it occurs in those parts of the field which are of least use and importance. Since this operation he has been able to look down in convergence without double vision, so returned to his former job.

At my request he returned for examination on December 7, 1918. He states that he has done his work very satisfactorily and without difficulty during the past year. At this time diplopia is still present but only in the extreme corners of the left upper and right lower motor areas: being similar but involving less area than it did on December 17, 1917. There was no diplopia for distance, but right hyperphoria of one quarter of a degree and esophoria of one half degree.

According to Posey, the credit for first suggesting tenotomy of the inferior oblique muscle belongs to Landolt who suggested it in 1885, but this author apparently never performed the operation. In 1906 Duane again brought to the attention of the profession the indications for this operation which had been performed by him; but it was Posey's article, in 1915, which pointed out its indications and value; and, by reporting the result of the operation on twenty-one cases, brought the subject to the general attention of ophthalmologists. The technique of the operation is fully described in this article and is essentially the same as that followed by Duane and suggested by Landolt.

Treatment: In view of the fact that approximately sixty per cent. of the cases of traumatic disturbance of the superior oblique muscle make a satisfactory recovery within a period of eight months—usually much sooner—prudence would dictate that any operative procedure should not be considered too early. The disturbances of this muscle due to indirect injuries are most likely to recover; but even those due to direct injury where the muscle or its tendon has not been completely severed, have ceased to cause diplopia or annoying symptoms after a few months.

When an operation has been decided upon the choice is between a tenotomy of the superior rectus of the same side and a tenotomy of the inferior oblique of the same side. The former operation has been quite satisfactory according to the reported cases, but when there are symptoms of spasm or of overaction of the inferior oblique of the same side (as in my case) a tenotomy of this muscle is the indicated operation.

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REPORT OF A CARCINOMA OF THE ORBIT.

SPECIMEN PRESENTED AT SECTION ON OPHTHALMOLOGY, NEW YORK ACADEMY OF MEDICINE, NOVEMBER 18, 1918.

BY DR. ARNOLD KNAPP, NEW YORK.

(With four illustrations on Text-Plates V. and VI.)

Mrs. E. R. W., aged 31, noted in the fall of 1910 a burning sensation in the right eye, with watering. Subsequently the pupil of that eye became somewhat dilated and the sight gradually failed. This was followed by a protrusion of the eye with involvement of some of the ocular muscles. The cheek at the same time became numb. As there was some discharge from the right side of the nose, the nose was operated upon, without any particular effect on the orbital condition. The patient was seen on March 3, 1911, by Dr. F. W. Marlow, of Syracuse, who found anæsthesia of the cornea, marked proptosis 4 or 5*mm*, eyeball fixed, neuroretinitis, and vision $\frac{6}{60}$; along the lower margin of the orbit there was distinct resistance. Dr. Marlow then kindly referred the patient to me for operation.

On October 11, 1911, I found that the right eye was pushed straight forward, and was completely immobile; anæsthesia of the cornea, of the eyelids, and of the cheek. A mass could be felt below and to the outer side of the eyeball. There was no particular change in the eye ground. On October 15th an exploratory Kroenlein operation was done. This showed a diffuse mass invading the periosteum externally and below the eyeball. As the tumor was not circumscribed enough to permit of a radical extirpation with preservation of the eyeball, only a piece of tissue was removed for microscopic examination and the wound closed. This examination showed fibrous tissue with proliferation of endothelial-like cells which was regarded by the pathologist (Dr. James Ewing) as a not particularly malignant process. An exenteration was then determined upon and carried out on November 1st. The contents of the orbit, including

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ILLUSTRATING DR. KNAPP'S ARTICLE "REPORT OF A CARCINOMA OF THE ORBIT."

FIG 1.
Showing topography of tumor, especially the diffuse fibrosis.

FIG. 2.
Involvement of nerve trunks and optic nerve sheath with epithelial tumor cells.

the invaded periosteum and the eyeball, were removed. A mass was encountered at the apex of the orbit which seemed to involve the optic nerve and extended into the ethmoidal cells. This was removed as thoroughly as possible. Healing took place slowly by granulations.

On January 15, 1912, right complete facial paralysis developed, affecting the tongue and the gums; the cheek and the nose were numb.

On May 16, 1912, the right side of the head enlarged, especially the frontal, temporal, and supramaxillary regions, and the patient complained of great pain in the upper jaw. The patient died on December 1, 1912. The vision in her remaining eye, the left eye, had been failing for the last three months and she became quite blind, suffering severe pain at the back of the head. The orbit filled up with a growth. The throat seemed partially paralyzed, making swallowing and the opening of the mouth difficult. The cause of death was a tumor of the brain.

The *microscopic examination* of the orbital mass reveals a diffusely infiltrating connective-tissue transformation of the orbital contents. This connective tissue varies in thickness and in the number of cells. It apparently replaces the normal orbital tissues. There are only a few globules of fat to be seen and the muscles are infiltrated with a disappearance and degeneration of the muscle fibers. The tumor has no particular capsule. A distinct characteristic is the constriction of all the tissues, particularly the blood vessels. No trace of the lacrymal gland can be seen; this is not unusual even in tumors arising from the lacrymal gland. Throughout this extensive connective-tissue stroma masses of epithelial cells can be seen constituting the parenchyma of the tumor. These cell collections are irregularly scattered; in places they form curving structures like fissures in the dense connective tissue, filled with epithelial cells which are small and crowded together. In other places the cells are collected in rounded structures, particularly in the region surrounding the optic nerve, where the other nerves are all involved. The optic nerve is not itself affected, but its sheath shows a particularly distinct infiltration of round, alveolar structures with marginal cells and a distinct lumen. Many of the nerve trunks in this region contain round and oval collections of epithelial cells. The cells vary in outline; they usually have large, rounded,

deeply staining nuclei with a well-defined protoplasm. In the rounded collection of cells the margin is composed of cellular protoplasm without distinct capsule.

The interesting clinical features of this tumor are its ***malignancy*** and the ***involvement of the nerves of the orbit*** in the extension of the tumor process. The duration of the disease was about two years; death occurred one year after exenteration of the orbit with the symptoms of a brain tumor, undoubtedly a direct extension of the orbital condition. The microscopic examination shows that the tumor extended particularly in the nerve trunks. The early immobility of the eyeball can be more easily explained by the extensive fibrosis and infiltration of the muscles themselves than by the involvement of the nerve trunks. Kuffler[1] observed an orbital tumor where the involvement of the nerves was an early and striking symptom. In his case the initial symptom was a VI. nerve paralysis which was followed in six months by the involvement of the other nerves and of the optic nerve. Six months later exophthalmos developed. At operation the orbit was found filled with tumor masses extending deep in the supraorbital fissure, and the patient subsequently died from brain tumor.

The histological characteristics of the tumor are the ***extensive fibrosis*** and the ***collections of epithelial cells***. The epithelial cells vary in size and shape from being small embryonal cells composed of only nuclei, and larger structures, cubical and cylindrical in alveolar arrangements, approaching the adenoid cystic tumor type. In Professor Ewing's opinion the connective tissue is not necessarily the result of a separate developmental disturbance, particularly as no mucin or cartilage were present, but it represents an ordinary, secondary process comparable to the overgrowth of fibrous tissue in scirrhous cancer and in rodent ulcer. The presence of these two classes of tissues suggests a mixed tumor such as occurs so frequently in the salivary glands. Warthin pointed out in 1901 the similarity which exists between growths of the salivary and of the lacrymal glands. The interpretation of these mixed tumors has changed in recent years and the views on the histogenesis have become definite. The tumors at one time were regarded as endotheliomats and as such they are usually

[1] "Endotheliom der Orbita," *Heidelberger Bericht*, 1911, p. 275.

Text-Plate VI.
Arch. of Ophth., Vol. XLVIII., No. 2.

ILLUSTRATING DR. KNAPP'S ARTICLE "REPORT OF A CARCINOMA OF THE ORBIT."

FIG. 3.
Nerve trunk invaded with groups of epithelial cells.

FIG. 4.
Involvement of ciliary ganglion.

reported in ophthalmic literature. Endotheliomata are diagnosticated by the morphology of the cells and their relation to the surrounding structures. Ewing believes that the cells in these tumors show no characteristics which permit their classification as endothelium. It is now the opinion of pathologists that endotheliomata occur only where the presence of epithelium can be excluded.

It is now generally accepted that the parenchymal cells are of epithelial origin and that the epithelium from which this is derived must be that of the lacrymal gland. Verhoeff[1] believes that the parenchyma of these tumors is derived from epithelium, on account of certain characteristics which he has demonstrated by special stains. This view also accords with our knowledge of the embryology of these glands, as the earliest trace of the lacrymal gland is a solid down-growth of epithelium from the conjunctiva. The stroma is an atypical development of mesoplastic cells, according to this author, which normally would have gone to form part of the stroma of the gland itself.

Krompecher,[2] whose classical investigations on the exclusive epithelial origin of these tumors are generally accepted, concludes that these mixed tumors belong in the class of basal-cell carcinoma and especially in the sub-group of adenoid cystic epithelioma. Under certain conditions true connective tissue, and by further metaplasia, cartilage may be derived from the basal epithelium. Krompecher interprets the salivary growths as of purely epithelial origin with peculiar mucoid and cartilaginous metaplasia.

Van Duyze[3] describes as a mixed epithelial tumor of the lacrymal gland a condition which in many ways resembles the tumor described in this paper. This author is convinced of the epithelial origin of the mixed tumors and that they are derived from two embryonal layers, though he does not accept unreservedly Krompecher's belief of the transformation of epithelium into connective tissue.

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[1] "The Mixed Tumors of the Lacrymal and Salivary Glands," *J. M. R.*, xiii., p. 330, 1905.

[2] *Ziegler's Beiträge*, 37, 1905.

[3] "Tumeur mixte epitheliale de la glande lacrymale," *Arch. d'opht.*, Juillet, 1910.

Ewing, in his new work on *Neoplastic Diseases*,[1] summarizes our knowledge of the origin of mixed tumors of the salivary glands as follows: "(1) The endothelial origin has been disproven. (2) No single source of the mixed tumors meets all the requirements. Some are distinctly adenomatous and probably arise from the acini and ducts of the gland in which they are well incorporated. Others are encapsulated or extraglandular and take the form of basal-cell or adenoid cystic epithelioma. These probably arise from misplaced and occasionally embryonal portions of gland tissue. Branchial remnants may possibly be connected with this group. (3) The derivation of mucous tissue and cartilage from gland epithelium has been satisfactorily proven and there is no necessity of including in the originating tissue any cartilaginous structures."

The difficulty has always been to explain the myxomatous tissue and cartilage which is often found in the stroma. Based on embryological studies, it is now believed that these tumors originate from portions of the embryonic lacrymal gland which have lost their connection with the ducts and have remained dormant as indifferent tissue for a length of time, and that the tumors are derived from early invagination of epithelium with the inclusion of mesoplastic tissue.

Alexander Fraser[2] finds that epithelial characteristics of both the pavement and glandular type have been demonstrated in these tumors beyond question. He does not favor the assumption of a mesodermal origin to explain the polymorphism of these tumors, especially the presence of cartilage or bone, and believes that the connective-tissue elements are derived by metaplasia from the epithelial cells.

Aside from these histological characteristics, the pure carcinomas of the salivary glands, according to Ewing, have a further distinguishing clinical trait in their malignancy, and this applies equally to the lacrymal tumors. They usually develop rapidly and while they are at first encapsulated, they soon invade the surrounding tissues. After extirpation prompt recurrence is observed. In advanced cases local and

[1] Saunders, p. 717, 1919.

[2] Alexander Fraser, "Mixed Tumors of the Salivary Gland," *S. G. & O.*, July, 1918.

general metastasis occurs. The clinical malignancy of these tumors is pronounced. Sometimes there is a history of a quiescent growth of long standing which eventually becomes active. Finally, the endotheliomatous origin of these tumors was attacked by those who insisted upon their cancerous nature.

SOME REMARKS ON THE PUPIL IN GLAUCOMA.

By Dr. JOHN DUNN, Richmond, Virginia.

THE report of the cases here commented upon was suggested by the following combination of symptoms observed in a case of simple chronic glaucoma. In a glaucomatous eye which could see light, and in which there was an entire absence of the primary pupillary response to light, the impact of light on the still sentient portions of the retina awakened a consensual response in the pupil of the opposite sound eye. At the same time the convergent pupillary response was present, as were all the pupillary responses consensual with those of the sound eye. So far as I know this combination of pupillary symptoms has not heretofore received comment in ophthalmological writings, and, as I see it, its chief importance lies in the light it seems to shed on the nervous mechanism concerned in the production of the primary pupillary response to light. In considering the damage done to the retinal functions as the result of this increased pressure in glaucoma, we must bear in mind that it is of two essentially different kinds, the direct and the indirect, and the loss of function is accordingly relative or absolute. In simple chronic glaucoma the contraction of the visual field is not altogether and directly the result of a general pressure of the vitreous body against the retinal elements, but in great measure is due to retinal atrophy, the necessary result of cutting off of the retinal circulation by constriction of the retinal arteries as they are bent over the edge of the excavated disk. The circulation through the peripheral twigs will first be interfered with. This is well shown in the case of A. E. (*vide infra*). Finally, however, the time comes when the generally increased intraocular pressure interferes directly with the functions of

those portions of the retina which have escaped atrophy. There seems to be clinical evidence that this pressure abolishes the regulative activities of the retinal pigment layer before it destroys the capabilities of response of the retinal ganglion cells. In acute glaucoma the intraocular pressure is a general one. The vitreous body as a whole is forced back against the retina. The attack may be so severe, during its height, as to deprive the eye of vision and yet it may be relieved and the eye show no constriction of its field for white. Following a severe attack of acute glaucoma, there is usually some mechanical paresis of the pupillary fibers, with a resulting characteristic dilatation. This paresis may or may not be of a permanent character. Thus, while acute glaucoma would seem to furnish the ideal conditions for determining whether pressure against the retina does or does not destroy the function of the ganglion cells before it destroys those of the retinal pigment cells, the tendency to coincident weakening of the constrictor pupillæ prevents in most cases our deciding this question. I have been obliged to have recourse to cases of simple chronic glaucoma, primary or secondary, to make the deductions here given, as all of the cases of acute glaucoma which I have seen since this paper was begun have either been too severe or have been seen too late in their history. In reading this paper it must be borne in mind that in no case, save those of the acute type, are we dealing with any paresis or paralysis of the pupillary fibers. It is well known that simple chronic glaucoma may proceed to complete blindness in one eye and yet this eye may show no demonstrable lessening of the depth of the anterior chamber and may retain its pupil equal in size with that of the opposite eye. Until its later stages the demonstrable damage is done to the retina and its blood-vessels. In these respects it differs greatly from the acute type.

The two following pictures, one of acute, the other of simple chronic glaucoma, are presented without complications in the cases of G. H. and L.

G. H., aged 58, had when I first saw her, been suffering for six weeks with acute inflammatory glaucoma of the left eye, which showed a steamy cornea, behind which could be indistinctly seen a partially dilated pupil in a shallow anterior chamber. No pupillary movements could be made

out. Fundus invisible. Vision, light perception. Under ether a broad iridectomy was done. At the end of one month, the following ocular conditions obtained. Vision, with correcting glasses, $\frac{18}{60}$. Clear cornea; under palpation normal tension; shallow anterior chamber; transparent lens and vitreous; cupping of disk very slight; indeed, so slight that in the ordinary examination of the eye no comment would have been made upon it. The pupil responded neither to light, nor consensually nor in accommodation. It was absolutely immobile. One month later: Pupil responded directly, consensually, and in accommodation. The anterior chamber was apparently no deeper. In this class of cases, the pupillary dilatation is the result of pressure against the root of the iris and there takes place a mechanical stretching of the sphincter pupillæ. Absence of pupillary responses is a necessary consequence. How long these responses will be absent after the tension of the eyeball has been removed, by operation and otherwise, will depend upon the character of the damage done by the pressure. If the pressure be continued long enough for the iritic substance to degenerate, the pupillary responses are permanently absent.

L., aged 70, whose vision had for a long time been getting bad, had, when he came for consultation, for two or three days been suffering severe pain in his left eye. Examination revealed the following: Tension + 2, cornea clear; anterior chamber not shallower than is normal for many old people; eye absolutely blind; lens and vitreous clear; deep glaucomatous cupping of disk; pupil of same size as that of opposite eye, 1*mm*, does not respond to light directly but responds actively both consensually, and in accommodation. Light thrown upon its fundus does not, however, awaken a consensual reflex in the opposite eye. Upward sclerocorneal trephining was done after subconjunctival injection of novocain solution. One month later: Tension sufficiently near normal for the eye to cause no discomfort. The pear-shaped pupil does not respond to light but responds both consensually and in accommodation.

Such are the two completed pupillary pictures; the one the product of acute inflammatory glaucoma; the other of simple chronic glaucoma. It is not the purpose of this article to discuss further the details of the manner by which the mechanical paralysis of the pupil present in the case of G. H. was brought about, nor to comment upon the varying degrees of pupillary paralysis to be found in different cases of acute inflammatory

glaucoma, nor to discuss the prognosis. We wish to confine our attention to the pupillary picture presented in the case of L.

L.'s glaucomatous eye shows a pupil that does not respond to light, but does respond as actively as that of the opposite eye both consensually and in accommodation. The eye is totally blind. We might say that there is nothing unusual in this; that the pupil in a totally blind eye cannot respond to light impulses on the retina; that it cannot originate the consensual reflex, either the direct consensual or the accommodation consensual reflex; that it can, however, show the convergence reflex so long as the power is retained of turning the eye towards the tip of the nose; that it can respond consensually, both directly and in accommodation and in convergence to impulses originating in the sound eye. Before we decide, however, that we have thus explained all there is to know about this pupillary picture, let us examine the case of P., aged 56. Her left eye has been the seat of simple chronic glaucoma for about three years. Both pupils measure about *2mm* in moderate daylight. The pupillary conditions are exactly the same as exist in the case of L., except that light thrown into the eye apparently awakens a consensual reflex in the opposite eye. In this case, moreover, the patient can tell when fingers are passed between the eye and the light. There is apparently abolition of the entire visual field save for a small area in the inferior quadrant. Here then is an eye which preserves light and in which there is no paralysis of the nerve supply to the iris and yet the pupil does not respond to the direct light impulses but responds as actively as that of the other eye both consensually and in convergence, and further, when light falls upon its fundus it apparently awakens a consensual response in the opposite eye. So far as I know this is the first time this exact combination of pupillary symptoms has ever been called attention to. It will be said that naturally the pupil does not respond to light impact upon that portion of the retina which is blind and that the pupil being small its response to light falling upon the still sentient part of the retina could be easily overlooked. To this I can only say the pupil was most carefully and repeatedly watched under a magnifying lens and no response could be detected.

Here then comes the interesting question. Is it possible for there to be no direct pupillary response to light in an eye which is capable of perceiving light and whose pupillary third nerve tract is intact as shown by its normal pupillary response both consensually and in accommodation? In my effort to solve to my satisfaction the problem of the Argyll-Robertson pupil upon purely theoretical considerations, I came to the conclusion that this must be so or that the A.-R. pupil must forever remain a mystery; that activities aroused within the retinal pigment layer following impact of light on the retina must without traveling centralwards along the optic nerve fibers be directly transmitted to the ciliary region and there arouse sensory impressions, which in turn are carried to the ciliary ganglia, in which body efferent motor impulses are aroused, which in turn result in the contraction of the pupil. At the time I expressed these views (ARCHIVES OF OPHTHALMOLOGY, vol. xlvi., No. 3) I was obliged to leave them without pathological confirmation, nor could I conceive of a way by which the activities of the pigment layer could be suppressed without at the same time suppressing the activities of the retinal cells into which they reach out during the periods of retinal response to light impact. I now believe it is a part of the history of many cases of simple chronic glaucoma. In simple chronic glaucoma there comes a time when the intraocular pressure is so great that it obliterates the normal activities of the retinal pigment cells. In some of these cases this takes place before all function in the overlying retinal cells is destroyed. Hence it comes about that the eye is still able to perceive light and yet the light impulses awaken no activity in the pigment cells. We, of course, have only clinical symptoms as proof of this belief. There is no question that in cases of simple chronic glaucoma, at a certain stage in its history the eye may still be able to perceive light and yet, so far as can be demonstrated, there is no direct pupillary response to the light falling upon the retina and this, too, in the face of an active motor nerve supply to the pupil. That light is perceived shows that some of the retinal fibers have escaped destruction. Why then is there no direct pupillary response? Is a larger volume of nerve impulses along the optic nerve fibers required to generate a sufficient activity in the motor

nuclei than is required to create a conscious impression in the cells of the occipital cortex? Are the retinal cells which convey impulses centralwards to the third nerve nuclei distinctly different from those which convey the impulses further backwards? If so, does a gradually increasing intraocular pressure destroy the function of the former sooner than it does that of the latter? There is no proof that any of these things are so. It is true that up to a certain degree the more intense the light impulse the more active are both the direct and consensual pupillary responses. It is also true that in a normal eye the pupil responds to very faint illumination of the fundus. It is also probably true that in a healthy eye there is a pupillary response for any degree of illumination which can be perceived.

How far this last statement is true for an eye such as we have under discussion is a question. That the glaucomatous process has not injured the motor control of the iritic movements is shown by the activity of these movements in the consensual and accommodation responses. Could we find among the uncomplicated monocular simple glaucomatous cases one in which there is retention of the light perception with absence of the primary pupillary response and at the same time impact of light on the retina causes a change in the size of the pupil of the other eye, *i. e.*, evokes the consensual reflex in the opposite eye, it would go far to prove our contention in regard to the nervous pathway pursued in the evolution of the primary pupillary reflex. In the case of A. E. (*vide infra*) impact on the fundus of the glaucomatous eye produces an active consensual reflex in the good eye, but only a very faint primary pupillary response in the bad eye, in which, however, the consensual reflex is active when light falls upon the retina of the good eye. This is a step forward in our contention. The case of P. (*vide supra*) apparently furnishes what we are looking for. When light is thrown upon the retina of her glaucomatous eye (the sound eye being excluded absolutely from the light) there is entire absence of the primary pupillary response. When, however, light is allowed to fall upon its retina, the sound eye being open, apparently there is a consensual pupillary reflex produced in the sound eye. This shows that light impulses pass along the optic nerve to the right third nerve nuclei with sufficient force to cross to the left third nerve nuclei and awaken a re-

sponse in the left pupil, and yet these impulses fail to awaken any response whatever in the pupil of the diseased eye. On the other hand light thrown into the left eye produces an active consensual reflex in the right, *i. e.*, the glaucomatous eye. This is an important observation and there can be deduced from it but one fact, and that is that light passing centralwards along the optic nerve is incapable of producing the primary pupillary reflex.

Some comments upon the activities of the retinal pigment layer are in order here. That the primary light reflex may be produced there must be present active retinal ganglion cells, active pigment layer cells, an active sensory nerve connection between the ciliary region and the ciliary ganglia, a functionating ciliary ganglion and active motor fibers from the ganglion to an active constrictor pupillæ. Destroy the retinal ganglion cells and you do away with the primary light reflex. You do not, however, do away with a certain tonic influence which the existing retinal pigment layer exerts over the activities of the ciliary ganglion, unless at the same time you entirely abolish the retinal vascular supply. The appreciation of this fact allows us to understand why in some blind eyes, with a normal motor nerve supply to the pupil, the pupil is only half dilated, while in others the pupils are widely dilated. In the latter case there is complete abolition of the pigment layer influence. Below are quoted two cases which illustrate this:

> L. H., aged 58 was, ten years before the occasion of his visit to me, shot through the left temple. The bullet went through the left eye, necessitating its removal. Passing across the upper part of the nose the bullet entered the right orbit, so severely damaging the right optic nerve that for a long time the eye was thought to be blind. Gradually the traumatic neuritis subsided, leaving sufficient vision for H. to go about alone and do such work about the house as did not require reading or writing. After some years his remaining vision began to deteriorate. When I saw him the following conditions obtained: Pupil 3*mm* in diameter; cornea, lens, and vitreous clear; nerve head white, its large vessels tortuous. The vision was sufficient for H. to see indistinctly the outlines of large objects. For instance, he saw well enough in a proper light to take a glass of water from a tray without striking the tray with his hand. There were no nystagmic movements of the eyeball. The in-

teresting feature of the case was that the pupil was totally unresponsive to light, although, when the patient was told to look at the tip of his nose the pupil contracted. The tension of the eyeball was above normal, which probably accounted for the late increasing diminution of vision. The papilla showed not the slightest cupping and this was so because of the changes produced by previous traumatic neuritis. This also accounted for the fact that there was a general diminution of vision over the whole field and for the further fact that there had developed no gradual contraction of the visual field. The increased intraocular pressure was evenly distributed over the whole retina, which was not subjected to a diminution of its vascular supply after the manner which occurs where there is cupping of the disk. Here then we have a retina responsive to light impulses, which impulses are transmitted by the optic nerve fibers all the way back to cortical light centers, and yet, although the mechanism of the third nerve and its centers is intact, we have no pupillary response to these light impulses, while at the same time the pupil responds actively in accommodation. If these observations are correct, then they would seem to show that the optic nerve fibers take no direct part in the production of the primary light reflex.

Let us consider for a moment the conditions present. Here is an eye which sees and in which there are movements of the pupil when the patient is told to look at the tip of his nose. The size of the pupil is abnormally large, but it is not widely dilated. There has been a traumatic optic neuritis and the intraocular tension is higher than normal. The condition of the nerve head shows that many of the optic fibers have atrophied and with them their retinal prolongations. Enough, however, have escaped to allow of an imperfect perception of large objects. The size of the pupil is what we should expect it to be when the autonomic reflex, *i. e.*, the primary response to light is removed, while at the same time there is no paralysis of either the motor fibers to the pupil or of the fibers which regulate the dilatation of the pupil. The abolition of the primary pupillary reflex in such a case as this removes the normal pupillary hippus and results in partial dilatation of the pupil. It does not result in complete dilatation of the pupil because the retinal pigment layer is not entirely destroyed, there being still circulation in the retinal vessels. Here then we have an example of the tonic influence of the retinal pig-

ment layer on the functioning of the ciliary ganglion even though the retinal pigment layer is not capable of the normal accurate function of its activities. Compare this with the next case, which owing to complete absence of retinal circulation there has been removed not only the active normal functioning of the pigment cells but an abolition of all function. There is no response on the part of the pupil to light because the increased intraocular pressure has stopped the activities of the retinal pigment cells. There is still light perception because the pressure has not been great enough to entirely destroy the functions of the retinal ganglion cells. Thus it would seem that we have pathological proof of the claim, that the primary pupillary response to light belongs to the autonomic system and is negotiated by the intraocular structures, the ciliary ganglion, and the iris, without the assistance of the optic nerve and the intracranial structures so long as these latter are normally performing their functions.

Etta G., full-blooded negress, married, aged 44. Eyes show the following conditions: Both pupils dilated *ad maximum*, and are totally irresponsive to light, directly and consensually, but do contract when patient looks at the tip of her nose. Patient can count slowly, with either eye, fingers held about a foot away. Both visual fields seem to be abolished save for a very small region directly in front of the eyes, showing that save just at the macula, the retina is not functioning. Both fundi present a picture rarely seen by the ophthalmologist. The right nerve head is snow-white and not excavated. At first glance no trace of a vessel, artery, or vein, can be seen on the disk, but by getting before the eye the lens which by the direct method gives the best view of the details of the disk, two very faint threads can be seen running, one upward, the other downward, from the center of the disk. Unless much care is exercised these remains of the first division of the central artery cannot be made out and the papilla looks like a large pure white disk set in the midst of an evenly mottled dark background. At first glance the retina seems to be devoid of vessels, either arteries or veins, but two minute whitish threads, although larger in diameter than those in the disk, can, under close inspection, be traced in the retina for a little more than a disk's distance, one running upward and outward and the other downward and outward. There is no visible disturbance of the retinal pigment of either eye. The left eye shows a condition identical with that of the right except

that two minute threads on the disk have a very faint broken pinkish line along their centers. How circulation through the retinal vessels sufficient to admit of any central vision, however slight, is kept up is difficult to understand in the presence of what is apparently complete obliteration of the retinal vascular system. The retina in neither eye shows any areas in which there is visible disturbance of the retinal pigment. Both eyeballs are hard, tension about + 1.

No history of the case is obtainable, save that the loss of sight was more or less gradual. Here is a case in which a person can count fingers at a distance of twelve inches and in which there is no paralysis of the motor nerves to the pupil as shown by the response of the pupil in convergence and yet in which the pupil responds to light neither directly nor consensually. This case might be considered one of the Argyll-Robertson pupil variety. It is not, however, an example of the true Argyll-Robertson pupil. In the case under discussion, the lack of direct response on the part of the pupil to light is due to the abolition of all response on the part of the pigment cells; not only of all response, but also to destruction of the retinal pigment layer, there being no circulation in the retina. There is thus destroyed the retinal pigment layer tonic influence in the ciliary ganglion and so there results complete dilatation of the pupil. I have never seen another case presenting an exactly similar picture in the fundus. The nearest approach to it have been the results of extensive syphilitic arterio and venous changes. In these cases, however, there have been visible some evidences of changes in the retina at places along the vessels. I have seen only two or three cases of quinine amblyopia, but in no one of these was the vascular obliteration comparable to that of the picture shown in this case. The absence of the consensual light reflex in the case of Etta G. is due to the fact that there is nothing to call it into existence, the two pupils remaining constantly the same size whether one or the other, or neither, or both, of the eyes are excluded from the light. The absence of the consensual light reflex in the contracted pupils of the true Argyll-Robertson type is to be similarly explained. This has been fully discussed elsewhere (ARCHIVES OF OPHTHALMOLOGY, vol. xlvi., No. 3). The absence of the direct response to light in the Argyll-

Robertson pupil is due to lesions within the ciliary ganglia which prevent the impulses from the retinal pigment cells from reaching the motor elements of the ganglia.

Take the case of A. E., aged 47. In 1910 an iridectomy was done on his left eye for simple chronic glaucoma. Prior to this time the vision of this eye had been growing gradually worse for eighteen months or more. A deep excavation occupying the outer five sixths of the disk was present. The main upper and lower retinal arteries and veins were constricted as they came from under the edge of the disk. Two small arteries and veins came through the nerve tissue of the inner one sixth of the papilla both above and below and were not constricted. Vision $\frac{18}{16}$. Right eye normal. Condition in November, 1918: Vision $\frac{18}{18}$. Extensive scotoma for nasal half of the field. A drawing had been made of the appearance of the disk in 1910 and apparently it had undergone no change during the intervening eight years. Right eye, vision normal; iridopsia when used for prolonged close work; tension and fundus not demonstrably abnormal. The pupillary movements are in every respect normal, including those constant delicate dilating and contracting movements (hippus) which are to be seen in all normal young eyes. Left eye shows a clean iridectomy. Along the edges of the iris are to be seen none of those oscillating movements just mentioned as visible in the right. At one visit so far as I could make out under a magnifying lens, the eye being examined before a window in bright daylight, there is no pupillary movement of any kind when light is thrown on the fundus, *i. e.*, there is entire absence of the primary pupillary response to light. At another visit, the intense light of an electric lamp being thrown upon the fundus, there could be made out a faint response on the part of the pupil. The consensual response from the opposite eye, however, is active. Light thrown on its fundus also calls forth the production of the consensual pupillary response in the right eye. The pupil contracts when E. looks at the tip of his nose, *i.e.*, in convergence. The pupil responds actively when light is thrown upon the fundus of the right eye.

Here then is an eye, which not only perceives light, but the details of objects, as shown by a vision of $\frac{18}{18}$. This fact shows that the tract from the retina along the optic nerve to the light perceiving centers in the cortex is not destroyed. Here is an eye which when light falls upon the still sentient parts of its retina awakens a consensual response in the pupil of the op-

posite eye. This shows that the nervous pathway from the retina to the motor third nerve nuclei is not entirely destroyed. Here is an eye whose pupil responds in convergence and also actively responds, consensually when light falls upon the fundus of the opposite eye and also responds consensually with convergence contraction of the opposite eye. This fact shows that the third nerve and its nuclear connections are intact. And yet, in this eye, there is no normal hippus, and at times even in bright daylight, as far as can be seen, an entire absence of all direct pupillary response to light falling upon the retina; while at other times, although the direct response to an intense light is present, it is so slight as to require close observation to detect it. In a healthy eye after a clean iridectomy has been done the pupillary response is normal, save that it cannot produce a round pupil. The absence of the direct response to light in this case cannot be said to be due to the iridectomy, for all of the other pupillary responses are not only present, but actively so. It cannot be said that the absence or the very faint direct pupillary response to light is due to atrophy of the optic nerve fibers for the eye has a vision of $\frac{18}{70}$ and the optic nerve transmits sensations to the third nerve nuclei sufficiently powerful to produce a consensual response in the opposite eye. No one will claim that the intraocular pressure which cupped the disk destroyed those fibers of the retina to the third nerve nuclei which produce the direct pupillary response and yet those fibers which produced the consensual response escaped. What then is the explanation of the absence of the normal hippus and the direct response to light? I can imagine but one answer which satisfies. And this answer is that the intraocular pressure has so damaged the activities of retinal pigment cells as to render impossible the primary or autonomic pupillary light reflex, save in response to an intense illumination, such as, the rays from a strong electric light held close to the eye.

In the future history of this case, there will be an entire and permanent absence of the primary light reflex, while there are still vision and sufficient vitality of the retinal visual cells to produce the consensual reflex in the opposite eye. When finally blindness sets in there will of course be not only an absence of the direct pupillary response to light impulses, but

also the loss of retinal power to cause a consensual reflex in the opposite eye. There will, however, remain the consensual, accommodative, and convergent reflexes in response to impulses originating in the opposite eye. We must bear in mind that functioning retinal cells and functioning pigment cell layers (whether the cells contain or do not contain pigment granules is immaterial. Witness the albinotic eye) are both necessary for the production of the primary light reflex. Completely destroy the retinal cells and no primary light reflex is possible. Destroy the function of the retinal pigment cell and no light reflex is possible. This latter, which we have tried to show, occurs in the late history of simple chronic glaucoma.

Simple chronic glaucoma occurs in two classes of eyes: (1) those in which the conditions admit of an increasing excavation of the nerve head; (2) those that do not admit of this increasing yielding of the papillary structures. The second class of cases I can recall examples of only in eyes which had been previously subject to optic neuritic changes. In the former cases the field of vision as stated above contracts in the earlier stages in a great measure pari-passu with the pressure upon the retinal arteries as they pass over the papillary ring. In both cases the increasing intraocular pressure seems to obliterate in those parts of the retina which escape atrophy from lack of direct nutrition from the vessels the finer activities of the retinal pigment cells sooner than it does that of the retinal ganglionic cells. The proof of this is to be found in the obliteration of the response of the pupil to light before the entire destruction of vision.

Lastly, compare the case of Y., aged 37. Five years previous to visit sight of right eye "went out in about three weeks." Examination of fundus revealed optic atrophy, with retention of the retinal circulation; the retinal arteries and veins showing only slight deviations from the normal in the size and regularity of outline of lumen. With this eye Y. can distinguish between light and darkness, but can see no object whatever; for instance, she can tell when the gas jet in a room is lighted, but cannot tell the direction from which the light comes, nor is there any perception of outlines of objects. The vision of the left eye is normal. Both pupils are normal in size and equal. Both respond directly, consensually, and in accommodation. When the left eye is

closed the right pupil dilates more than the left pupil does when the right is closed. In the same way the consensual response of the right eye is more active than that of the left. In other words, if the left eye be closed the pupil of the right eye increases its diameter by 1*mm;* when, on the other hand, the right eye is closed, the left pupil dilates, but the aid of a magnifying glass is required to see the movement, which, however, is distinct. This only shows that the amount of impulse passing from the retina along the right nerve to the third nerve nuclear region is less than that under the same degree of illumination passing along the left side to the third nerve nuclear region, and also that the activities of the retinal pigment cells is less for the diseased eye than for the healthy one; the former regulating the consensual reflex; the latter, *i. e.*, the activities of the retinal pigment cells, the direct pupillary response to light. Cases such as this are seen every day in practice and this one is repeated here for comparison with the cases above reported and commented upon, *i. e.*, those cases in which an eye can see and the pupillary motor nerve tract, in so far as it is represented by the retina, optic nerve, third nerve centers, and motor ocular fibers to the pupil, are all functioning and yet the pupil does not respond to light impulses. This case is reported in contrast with that of L. (*vide supra*). In one case we have partial optic atrophy with increase of intraocular tension; in the other partial atrophy in an eye with normal tension.

In the case of G. H. (*vide supra*), where all of the pupillary reflexes were abolished as the result of pressure upon the root of the iris, it was noted that after the iridectomy had lessened the intraocular tension, gradually all of the pupillary reflexes returned.

Whether in a case of simple chronic glaucoma, which has progressed to the point where the primary light reflex has been abolished, this reflex can ever be restored as the result of an operation, I am unable to say. How far the condition of the pupil will help us to select the type of operation in any given case, I am as yet without sufficient experience to state.

Or, again, take the following excerpt from the case of G., aged 36. On the tenth day after the onset of an attack of quinsy, while the tonsil was still inflamed, she began to be conscious of a sensation of pain behind her right eye, a pain which forced movements or pressure upon the eyeball accentuated. When she awoke the following morning, she found she was entirely blind in this eye. Examination the same

afternoon showed retrobulbar neuritis, which manifested itself by a blurring of three fourths of the pupillary edge and interference with the circulation in the retinal veins. The eye was totally blind. There was complete abolition of the primary pupillary reflex and of the power to originate the consensual reflex in the opposite pupil. The consensual reflexes, however, generated by the retina of the healthy left eye were retained in full activity by the right eye. Five days later the vision had so far returned that the patient was able from the outer quadrant to imperfectly count fingers at one foot. The primary pupillary response to light was still entirely absent but the impact of light on the retina could apparently originate the consensual reflex in the left pupil. When light was excluded from the left pupil the right pupil became semi-dilated and immobile. How are we to interpret these pupillary symptoms? They show clearly that light impulses passing along the optic nerve are powerless to originate the primary light reflex: for (1) in this case, light impulses pass along the optic nerve, as is demonstrated by the patient's ability to count fingers; (2) apparently the light impulses reach the third nerve nuclei, for they seem to generate the consensual pupillary response, in the opposite eye, and yet the primary pupillary reflex is absent. That the pupil is only semi-dilated when all light is excluded from the opposite eye shows that the retinal pigment layer is nourished but is incapable of its normal variation in response to activity in the retinal ganglion cells because, in turn, of the functional disturbances in these ganglion cells caused by the retrobulbar pressure in the optic nerve fibers. In other words, were these retinal pigment layers abolished the pupil would be fully dilated. That the retinal ganglion cells and their prolongations are sufficiently active for light impulses to reach the optic brain centers, although there is still absence of the primary pupillary response to light, shows that there is still loss of the normal variation of function in the retinal pigment cells, which variation in function is a *sine qua non* of the primary pupillary response to light.

This case was repeatedly observed with much care. A thick wad of cotton was held firmly over the closed lids as the most satisfactory way of excluding all light from the sound eye while the monolateral responses of the right pupil were examined. An electric flash light was set in a thick paper mailing case, one end of which was shaped so as to fit accurately to the brow, nose, and cheek. This was used in testing whether the diseased retina was still capable of originating a consensual light reflex in the opposite eye. The normal hippus of the left pupil made the certain determination of the presence of this consensual reflex less easy

than one would think. At times there would seem to be no question of the presence of this reflex, at other times it would seem to be absent. This was especially true from the tenth to the fourteenth day of the beginning of the retrobulbar inflammation. The cloudy swelling which at first was confined to the immediate vicinity of all but the inner one fourth of the disk margin gradually increased until it involved the whole edge of the disk and extended into the retinal tissues above and below for as much as half a distance. This was accompanied by a corresponding dilatation of the big retinal veins. At the time, although there was distinct perception of light for the outer part of the field, the patient volunteered the information that the amount of vision varied greatly at different times of the day; at times she was uncertain whether she could see light at all. On the fourteenth day although the vision had not materially improved, the primary light reflex and its hippus returned in the right eye, although not so actively as they were in the left eye. Note the return at the same time of the primary light reflex and its accompanying physiological variations which we term hippus. The explanation of this is that the swelling in the optic nerve had subsided sufficiently to allow of the physiological interactivities of the ganglion cells and the pigment layer cells. The ever varying hippus of a normal pupil tells of the impulses sensory, motor, and sympathetic, of varying intensity which are constantly reaching and being discharged from the ciliary ganglion.

In examining the pupillary reflexes in such eyes as those which form the subject of this paper, one must bear in mind that inflammatory pressure upon the optic nerve fibers or retina allows only a relatively small amount of retinal impulses to pass backwards and we get, therefore, only a feeble response from the central nuclei and the cortex. This renders it difficult to be sure whether or not the pupillary movements in the sound eye, although they are apparently the consensual reflex, are not in reality only a part of the normal hippus. This is especially true in a case of a young person whose nervousness renders the hippus abnormally active. This accounts for the frequent use of the word "apparently" in the course of this article.

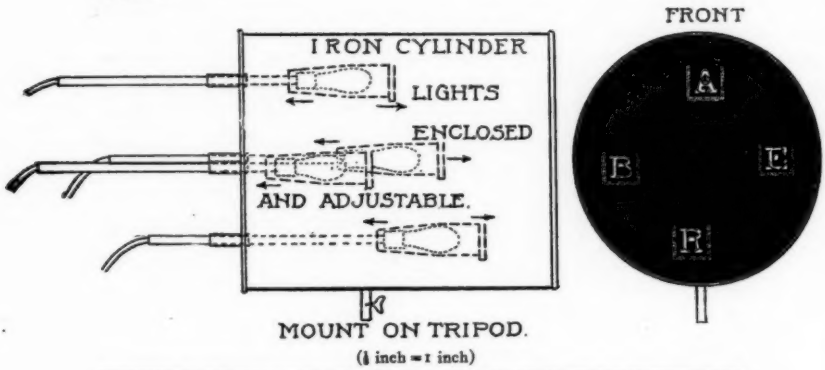
A DEVICE FOR THE EXAMINATION OF DISTANT STEREOSCOPIC VISION FOR FORM AND COLORS.[1]

By Dr. MARTIN COHEN, New York City.

(With one illustration in the text.)

THE use of the stereoscope in conjunction with a stereoscopic test card is the method usually employed for the examination of aviators' stereoscopic near vision; this examination, however, does not fulfill the requirements for distant stereoscopic vision, which is most essential.

Individuals with muscular imbalance for distance only, can successfully pass the near stereoscopic test while they generally fail in the test suggested by the present device. The principle involved in this instrument consists in the placing of certain letters or colored glasses at definite distances in space, thereby representing volume and visualizing a natural perspective. This simple apparatus, as illustrated, is made as follows:



[1] Presented at meeting of Section on Ophthalmology, New York Academy of Medicine, November 18, 1918.

Four white letters with a black background are selected from Snellen's test card of the $\frac{1}{4}\frac{0}{8}$ or $\frac{1}{3}\frac{0}{8}$ line. These letters are placed at the extremity of four $\frac{1}{8}$-inch black tubes ten inches in length, allowing the letters to be readily moved back and forth at definite distances by withdrawing or advancing the inner tube from the rear. The far ends of the tubes are inserted through a black metal disk 11¼ inches in diameter, and the tubes are located two inches from the margin of the disk,—namely, above, below, and laterally, but not on the same place. The instrument is encased in a black hollow cylinder, so as to avoid shadows, and attached to a movable stand.

In order to obtain a standard of luminosity for the letters and colors, they are mounted on glass in individual encasements, with suitable posterior illumination.

The tubes are graduated and can as stated be drawn backward from the rear to secure any definite antero-posterior displacement for each letter or color.

Since the presentation of this device, I have been investigating the effect of various colors arranged stereoscopically, in order to ascertain its practicability. The colored thin plate glasses or colored isinglasses can be readily inserted where the letters are located.

The examination of the individual is conducted as follows: He is placed at thirty or forty feet from the instrument, depending upon the size of the letter indicated above the Snellen test card which is used. A mirror can be intercepted if necessary. Both eyes are directed on a level with the center of the instrument. In emmetropia, the antero-posterior displacement of each letter is two inches when using Snellen's test card of the $\frac{1}{4}\frac{0}{8}$ line; the lateral displacement of four inches is not varied in this device.

The individual is then requested to call off the letters or colors as they appear nearest to him, after waiting for a few minutes to allow for his visual adaptation. In examining several individuals at the same period and to avoid the memorizing of the letters, an interchange of letters or colors is readily made. This apparatus can be used for applicants seeking positions in which distant stereoscopic visual acuity and color sense are considered essential.

THE JAW WINKING PHENOMENON AND ITS EXPLANATION.

By Dr. ANTON LUTZ, Habana.

(With one illustration on Text-Plate VII.)

UNDER the name of "Jaw Winking Phenomenon" we understand the curious and very striking appearance of retraction of the upper eyelid, during movements of the jaw, of the face, of the pharynx, and of the tongue.

Since the first description by Marcus Gunn,[1] there have appeared about ninety observations in the literature of the subject. A comparison of them gives us the following conclusions:

1st. The "Jaw Winking Phenomenon" appears more frequently in the male than in the female sex; in the majority of cases the retraction occurs on the left side.

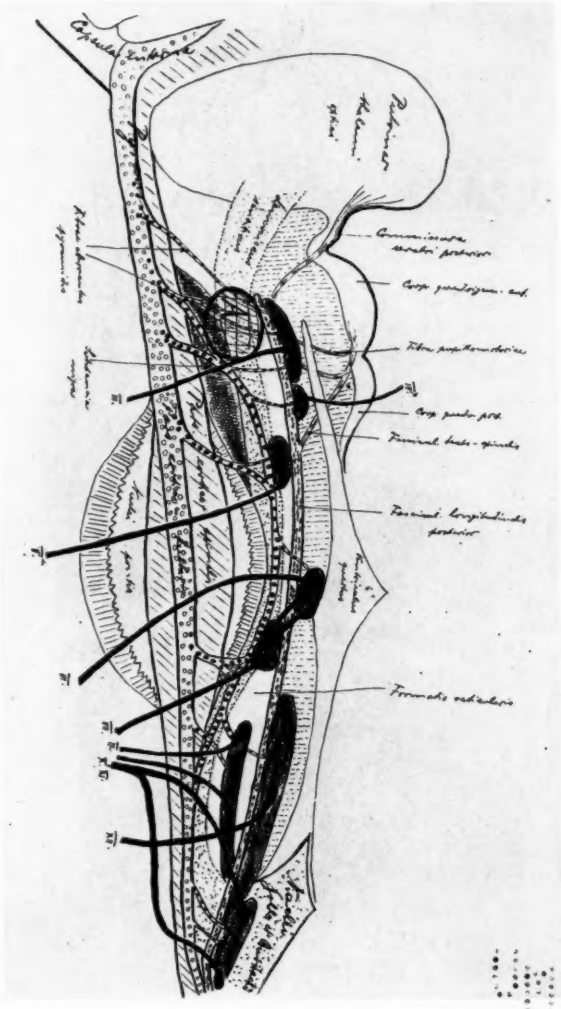
2d. The retraction takes place, as a rule, on one side only; in two cases it was found to be bilateral: Adamück[2] and B. Harman.[3]

The case of Beaumont,[4] which is referred to in some papers as a bilateral case, can only be considered as a case of normal concomitant movements.

3d. The majority of patients tell us that the phenomenon was already in evidence at the time of their birth and that it continued during their lifetime without any alteration. In seven cases the phenomenon developed in later years; these are the cases of Block[5]; of Kraus[6]; of Menacho, when it appeared in the twelfth year[7]; of Friedenwald, in the sixth year[8]; of

[1] *Transacts. of Ophth. Soc. U. K.*, 1883.
[2] *Klin. Monatsbl. f. Augenh.*, 1888.
[3] *Ophthal. Soc. U. K.*, 1903.
[4] *Lancet*, 1893.
[5] *Nederl. Tijdschr. v. Geneesk.*, 1891.
[6] *Dissert.*, Göttingen, 1881.
[7] *Annales d'Oculistique.*
[8] *Centralbl. f. A.*, 1896.

ILLUSTRATING DR. LUTZ'S ARTICLE ON "THE JAW WINKING PHENOMENON AND ITS EXPLANATION."



(*Sketch after Déjérine*)

Fränkel, in the thirteenth year[1]; of Uhthoff, in the sixth year[2]; and of Cantonnet,[3] in the twenty-first year, when it suddenly made its appearance in a soldier after the extraction of a tooth, together with diplopia and transient facial palsy. The patient of Gaultier and Bucquet[4] acquired it at fifty-five years; he was diabetic and awaked one morning feeling somehow ill and congested; the left side of his face and of his entire body felt cold; the left half of his face had a violet aspect, arm and leg had normal color; he quite soon improved, so that he could go to his daily work; coming back for lunch, his children began to laugh at his funny left eye. In the case of Fränkel the phenomenon showed some improvement after a few years; it even disappeared altogether, in the case of Gunn; in the case of Kraus the retraction of the upper eyelid disappeared but the ptosis continued. The phenomenon became more marked, with time, in the cases of Block and Adamück.

4th. The phenomenon also sometimes appears in several members of the same family. Thus, Meyer[5] observed the same phenomenon in father and daughter; Block noted it in two brothers.

5th. The phenomenon can best be observed when the patient looks downward, and becomes invisible during elevation of the sight. When a normal person looks upward the cornea touches the margin of the elevated lid and there is no space left to admit of the retraction being seen.

6th. The retraction is in nearly all cases involuntary. In only one case, which I described in *Kl. Monats. f. Aug.*, 1914, could the patient also produce the phenomenon voluntarily, without any movement of the jaw, through intense downward looking. In no case, of those published to date, could the phenomenon be suppressed at will.

7th. The phenomenon appears very rarely alone without other complication. Such cases, however, are those of Fuchs,[6] Just,[7] Fränkel, Van Lint,[8] Wilbrandt,[9] and Stephenson.[10] All

[1] *Kl. M. f. A.*, 1888.
[2] *Berliner kl. Wochenschr.*, 1888.
[3] *Archiv. d'Ophtal.*, 1909.
[4] *Gazette des Hôpitaux*, 1911.
[5] *Recueil d'Ophtal.*, 1889.
[6] *Heidelberg. Gesell.*, 1888.
[7] *Berliner kl. Wochenschr.*, 1888.
[8] *Soc. Belge d'Ophtal.*, 1908.
[9] *Neurologie d. Aug.*
[10] *Ophthalmoscope*, 1908.

the muscles of the lid and of the eyeball functioned absolutely normally and the phenomenon was only produced by movement of the jaw. In the case of Clarke it was produced without any movement of the jaw, through intense downward looking. Generally the phenomenon is accompanied by involvement of some of the eye muscles, especially those of the lid. About eighty per cent. of the cases show ptosis, whether complete or incomplete (Sinclair[1]), *i.e.*, visible only upon elevation of the lids. The retraction of the eyelid preceded the appearance of the ptosis in the case of Fränkel by about five years; in the case of Cantonnet the retraction followed the appearance of ptosis about fifteen years later. The mobility of the eyeballs is generally normal; but there is also found paralysis of different muscles (about twenty observations),—mostly of the rectus superior; far more rare are those of the rectus internus, rectus externus, obliquus superior, and obliquus inferior. Vossius[2] saw it in one of twins who each had a complete bilateral ophthalmoplegia externa congenita. These paralyzed muscles of the eyeball never show such concomitant movements as the levator palpebræ sup.; they mostly show an incomplete paresis. The internal eye muscles were never affected in congenital cases, so far as I could learn from the literature of the subject. In the cases of Demaria and Caldora[3] and of Gunn, an anisocoria existed, but no alterations of the pupillary reactions. The case of Rampoldi[4] is an exception: the raising of the lids was produced by clonic convulsions,—the lid of one eye fell while the other went up; the pupillary reactions were normal, but the pupils contracted during opening of the lids and dilated during closing the palpebral space; the irregular clonic contractions of the lids and pupils persisted during sleep. This case suggests an athetosis and has probably its own etiology (lesion of the pedunculus cerebel anterior and nucleus ruber).

In the case of Wecker there existed further a certain rigidity of the jaw; the patient was unable to open his mouth like normal people.

Uhthoff observed in his case a slight contracture of the

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[1] *Ophthal. Rev.*, 1895.
[2] *Beiträge z. Aug.*, 1892.
[3] *Soc. de Oftal. de Buenos Aires*, 1917.
[4] *Annali d'Ottalmol.*, 1884.

facialis of the same side without any change in the electrical reactions.

8th. The retraction of the eyelid is a pathological appearance; under normal conditions it cannot be observed in healthy people; consequently it differs fundamentally from the concomitant winking contractions of the orbicularis oculi, which follow so often a facialis paralysis; this latter represents an absolute normal movement which any normal man can voluntarily produce; it is only connected with erroneous impulses. In acquired cases the Jaw Winking Phenomenon appears suddenly, the facialis concomitant movements occurring only a few weeks after the injury, corresponding to the time necessary for the nerve fibers to renew their growth in the new paths.

9th. In the majority of cases the phenomenon can be produced by lowering the jaw, in speaking, singing, and chewing. It is only produced by opening the mouth; never by closing it. In about the same number of cases it is produced by moving the jaw downward and to its opposite side. In rare cases it is produced by lateral movements of the jaws. Far more seldom are the cases in which it is produced by laughing, blowing the cheeks, sucking, swallowing, or thrusting out the tongue: Hubbel,[1] Meyer, Block, Grimsdale,[2] Lutz, Cokayne,[3] Zimmermann[4]; it was produced by simple lateral movements of the eyeball in the cases of Pick[5] and Pflüger[6]; and what is more surprising, by closing the lid of the contralateral side in the cases of Bull,[7] of Marbaix,[8] of Higier,[9] and of Von Reuss.[10] These latter cases prove that the Jaw Winking Phenomenon is not only produced by innervation of the nuclei of the same side, but also by that of the contralateral side.

These clinical observations show us that the retraction of the eyelid is associated with innervation of the trigeminus,

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[1] ARCHIVES OF OPHTHAL., 1893.
[2] *Transactions U. K.*, 1902.
[3] *British Journal of Children's Diseases*, 1914.
[4] *Am. Journal of Ophthal.*, 1918.
[5] *Deutsch. med. Wochenschr.*, 1905.
[6] *Heidelberg. Gesell.*, 1892.
[7] *Kl. Monatsbl. f. Aug.*, 1888.
[8] *Soc. Belge d'Ophtal.*, 1908.
[9] *Deutsch. Zeitschr. f. Nerven.*, 1902.
[10] *Weiner kl. Wochenschr.*, 1889.

which lowers the jaw by the musculus mylo-hyoideus and the anterior part of the musculus biventer, and which produces lateral movement of the jaw by the musculus pterygoideus externus; with that of the abducens (musculus rectus externus), with that of the facialis (musculus risorius and buccinatorius, as well as orbicularis oculi and posterior part of the biventer); with that of the glosso-pharyngeus and vagus (m. constrictor pharyngis); finally with that of the hypoglossus which thrusts the tongue out of the mouth by the action of the m. genio-glossus. The musculi masseter, temporalis, and pterygoideus internus innervated by the trigeminus cannot produce the phenomenon.

10th. All these cases, the congenital as well as the acquired, have a common feature, namely that the abnormal movement of the lid occurs with the so-called principal movements of Munk (such as chewing, swallowing, laughing) which are already developed in the first days of the newly born infant, and whose centers must be searched for in the thalamus opticus. The Jaw Winking Phenomenon is never found together with the separate movements of Munk, which develop only later together with the cortex cerebri, *e.g.* wrinkling of the forehead.

11th. The operative treatment of the Jaw Winking Phenomenon, in which the methods of Angelucci, Hess, and Lapersonne were used, only resulted, as far as I could see from one personal observation and a few reports in the literature, in correcting the ptosis. The retraction of the eyelid remained unaltered or appeared again soon afterwards.

Various opinions have been expressed as to the etiology of the Jaw Winking Phenomenon:

(*a*) Adamück[1] alleges a stasis venosa in the chewing muscles. Castellanos[2] believes it to be produced by abnormal insertion of the eyeball muscles in the orbit. Demaria and Caldora speak in favor of a lesion residing in the intercortical association fibers of the frontal convolutions.

(*b*) Some authorities consider it to be only an abnormally strong but physiological concomitant movement. Against this latter opinion we recall that normal people cannot retract the lids so far backward, nor can they do so on one side only,

[1] *Kl. Monatsbl. f. Aug.*, 1888. [2] *Vida Nueva*, 1915.

and that this concomitant movement is restricted to only one muscle, not to an entire group of muscles as is observed in normal physiological concomitant movements, *e.g.* in children with inflamed eyes when they are asked to open them, opening the mouth at the same time,—or in pathological concomitant movements, *e.g.* after hemiplegia. The real concomitant movements are always bilateral and can be observed in any child under three years, in whom inhibitions are not sufficiently developed. If we show to a young child a shining object, it always stretches both hands towards it. These concomitant movements appear in the rule after trauma in the brain, *e.g.* through encephalorrhagia in later years, as consequence of the loss of certain inhibitions.

(*c*) Bishop Harman[1] tried to explain it as an atavistic phenomenon. He considers the Jaw Winking Phenomenon "as a revival of an old-time and long-accustomed associated movement." He reminds us that in lower animals the nucleus facialis and the nucleus masticatorius form a single nucleus, and that the movements of the jaw and of the nostril work always together. And really, physiology tells us that strong opening of the mouth, *e.g.* in yawning, is accompanied by the action of the musculus tensor tympani (V), Politzer, meanwhile closing of the eyes is accompanied by the action of the musculus stapedius (VII), Lucæ. But he believes the Jaw Winking Phenomenon to be produced by a loss of equilibrium between the levator and the depressor palpebrarum, inasmuch as during the action of the pterygoidei, the orbicularis is relaxed and the more feeble levator can come into play. Against this opinion we must remember that it is not the orbicularis but the levator palpebræ which shows a lack of relaxation, as is best illustrated by the fact that some patients experience a resistance when trying to close the lids.

(*d*) The English Commission (1884) which studied the case of Gunn explains the phenomenon in the following manner: The musculus levator palpebræ receives not only fibers from its own nucleus, but also from the motor part of the trigeminus which is situated very near to that of the oculomotorius. The majority of observers adhere to this explanation for the congenital cases of Jaw Winking Phenomenon; for

[1] *Ophthal. Rev.*, 1901.

instance, Pontico,[1] as well as Bielschowsky in *Graefe-Saemisch*. It, however, needs more ample consideration. This theory presupposes one cerebral center to be supplied by another, and it contradicts an old law in anatomy that a muscle does not change its primitive nerve supply, though it can change to a new position or acquire a new function. We should remember, furthermore, against this explanation, the following points: 1st. It is very surprising that only the levator palpebræ superioris receives these supplementary fibers, and not also the rect. sup. forming the fibers of the levator palpebræ superioris and those of the rect. sup. together with the ramus sup. of the oculomotor nerve. 2d. If his theory were correct, the levator palpebræ superioris should in many cases receive the supplementary fibers, not only from the nucleus masticatorius alone but also from the nuclei VI, VII, IX, X, XII, which are situated at a distance,—and this is very improbable. 3d. The theory cannot explain why the phenomenon appears in many cases so suddenly, *e.g.* in the case of Cantonnet; that it grows worse, better, or even disappears. It is difficult to understand, according to this theory, why the supplementary fibers did not function before the appearance of the Jaw Winking Phenomenon, or why they lost the function after the disappearance of the retraction of the eyelid. 4th. In some cases ptosis preceded, in other cases ptosis followed, the appearance of the Jaw Winking Phenomenon. These observations are contradictory, in that the normal innervation of the levator should undergo changes, while an abnormal origin functions well.

Helfreich[2] came independently to the same conclusion as the English Commission, and expressed the opinion that these supplementary fibers traveled in the fasciculus long. post.

(*e*) Bielschowsky, who adheres for the congenital cases to the opinion of Helfreich, believes that the acquired cases of abnormal lid movements appearing in the recession of basal oculomotor nerve diseases are produced in a similar manner as the concomitant movements of the lids after peripheral facial palsy. These acquired cases are characterized by the basal seat of the lesion. Clinically, they show, during innervation of certain muscles of the eyeball (especially adduction),

[1] *Thèse de Paris*, 1910. [2] *Heidelberg. Gesellsch.*, 1888.

a retraction of the lid. Bielschowsky and his pupil Eppenstein explain such cases on the ground of the experimental investigations of Lifschitz. Lifschitz[1] proved anatomically that after peripheral lesion of the facialis, the regenerating fibers found their way during the healing process into the old sheaths of Schwann and that they did not always return to the same muscles as before, but, in greater or lesser numbers, remained in foreign muscles. The analogy of these acquired cases with those of congenital Jaw Winking Phenomenon is so surprising that one may be tempted to explain the Jaw Winking Phenomenon in the same manner. That this opinion cannot be accepted in such cases as, for instance, Cantonnet's, we may conclude, from the following points: 1st. The concomitant movements of the eyelid after facialis palsy are movements which any normal man can perform; they appear only in an irregular manner together with another desired movement, because the various muscles are no longer innervated separately by their fibers. On the other hand, the retraction of the eyelid in the Jaw Winking Phenomenon is quite an abnormal movement which no normal man can produce. 2d. If the phenomenon were produced by erroneous growing of the regenerating fibers of the roots of the bulbar nerves through the old sheaths of Schwann into the path of the roots of the oculomotor nerve, we should expect, not a concomitant movement of a single eye muscle, but of a series of muscles, especially of those which show paresis, *e.g.* rect. sup.; consequently we should find an irregular movement of the different muscles of the eyelid as well as of the eyeball, because the independent action of one muscle is no longer possible. 3d. We should further observe an abnormal play of the internal eye muscles in the same manner as of the external, and this is contrary to the facts. 4th. This theory cannot explain why the phenomenon appears sometimes instantly after a trauma, because the regeneration of nerve fibers always requires some time. 5th. Against an infranuclear seat of the lesion in congenital Jaw Winking Phenomenon speaks further the fact that it was found in two cases on both sides.

The explanation of peripheral abnormal growing of nerve fibers has much in its favor, as to cases of retraction of the

[1] *Monatsschr. f. Psych. u. Neur.*, 1906.

eyelid in adduction of the eyeball, *e.g.* after basal brain affections, but for the above-named reasons we cannot use it for the congenital Jaw Winking Phenomenon.

(*f*) In two previous papers[1] I spoke in favor of a supranuclear lesion as explaining the Jaw Winking Phenomenon, emphasizing always that the lesion should be expected in the neighborhood of the nuclei on account of the paresis of the other eye muscles which behave like nuclear lesions. In favor of such a theory we can remember: 1st. Ptosis and other symptoms can completely fail, and in these cases Helfreich's theory cannot explain why the levator palpebræ sup. had so many supplementary origins or why the fibers of the nucleus masticatorius had found their way to the musculus levator palpebræ. Lifschitz's theory could not explain the origin of the abnormally regenerated fibers. 2d. In almost all cases the pupillary functions are not altered, which finds its explanation in the fact that the involuntarily acting nucleus sphincter iridis receives its orders from the corp. quad. sup. ant. through fasciculus tecto-bulbaris and in that the other voluntarily acting eye muscle nuclei receive the irritation through the pyramidal tract. 3d. In the cases complicated with ptosis the eyelid is only paralyzed as to voluntary innervation, but not as to involuntary retraction during the phenomenon. Furthermore, we can very often observe an incomplete relaxation of the levator palpebrarum when the eyelids are slightly closed, and this speaks more in favor of a spastic than a flaccid palsy. 4th. The vehemence of the retraction, which cannot be found in normal eyes, and which tends to show furthermore the preëxistence of a normal infranuclear path. If Lifschitz's theory were applicable, we should observe feeble and irregular retractions of the eyelids, such as we see in the facialis concomitant movements. 5th. The phenomenon represents a disturbance of coördination, inasmuch as normal people cannot lift one lid alone, though the majority can close one eye alone. 6th. In one of my cases the phenomenon could be produced voluntarily without the slightest movement of the jaw, etc., by simply looking downward, while the other paretic eye muscles did not show

[1] *Kl. Monatsbl. f. A.*, 1911, and *Anales de Oftalmol.*, 1914.

any concomitant movements. This could hardly be possible if the infranuclear path were the seat of the lesion.

The vehemence of the phenomenon, the fact that it could voluntarily be produced in one of my cases, and the fact that it can be acquired suddenly, induced me to believe that the Jaw Winking Phenomenon is caused by the suppression of a normally existing inhibition. The following sketch after Déjérine (*Sémiologie du système Nerveux*, 1914) gives a better view of where the lesion could be found.

It first suggests one more explanation: If we accept, for example, a lesion in the spot marked with the circle "A," produced by embryonal inflammation or hæmorrhagie, and which was followed by the interruption of the fibra aberrans pyramidis, carrying the voluntary impulse to the anterior pole of the nucleus oculomotorius, we could understand why in congenital cases the paresis of the lid and of the other eye muscles developed; the Jaw Winking Phenomenon could then be caused by part of the regenerating fibers, which erroneously find their way to the levator nucleus instead of to the true corresponding nuclei, V, VI, VII, etc. It would explain at the same time why the pupillary fibers are not affected because their path comes down from the corp. quad. ant.; it could furthermore explain why the infranuclear levator path functions well during retraction although the lid cannot be raised voluntarily. But against such explanations we must record the theory that supranuclear fibers have as a rule a bilateral effect, though we have as yet no proof that their crossed and uncrossed fibers have also really the same effect. It must be remembered that we can observe the bilateral loss of the effect of any cortico-bulbar fiber only when the interruption takes place at a certain distance from the bulbar nuclei. If the lesion is situated very near to the nuclei we can understand that the focus cuts the fiber of one side but leaves untouched the collateral of the same fiber going on the other side. We record furthermore the few clinical observations in which certain people can move one eye independently of the other, and more especially the experiment of Adamück and Bernheimer, who separated the paired bulbar nuclei by a median section, after which operation the animals could move each eye independently but had lost the synergic binocular movement. But this supranuclear

explanation would hardly satisfy us in cases where the phenomenon developed transiently in the regression of a basal oculomotor nerve palsy; so we can readily understand that the focus acts at the same time on the supranuclear as well as on the infranuclear fibers. It would satisfy us even less in cases like Cantonnet's, where the phenomenon appeared suddenly after trauma, for if this etiology were true, we should observe an interval between the trauma and the appearance of the Jaw Winking Phenomenon. We must further remember that the principal movements produce the retraction of the eyelids, while the innervation of the levator palpebræ or of the other paretic eye muscles does not produce any abnormal concomitant movements of the muscles of the jaw, face, pharynx, etc.; that such vice versa movements appeared, as they do in fact in facialis concomitant movements, we could theoretically expect for the reason that the fibra aberrans pyramidis, which normally go to the anterior pole of the oculomotor nucleus, could send, after their destruction, regenerating fibers to the nuclei of V, VI, VII, etc., and thus produce concomitant movements of the muscles of the jaw, etc. This has not yet been observed, and argues likewise against supranuclear origin by destruction of pyramidal fibers. This forces us to look for the lesion in the immediate neighborhood of the bulbar nuclei.

The special fact that the Jaw Winking Phenomenon can make its appearance suddenly argues in favor of interruption of the normally existing path. Also, some clinical observations strengthen this supposition, especially the vehemence of the phenomenon. The English Commission has already pointed out an insufficient relaxation of the levator palpebræ during closing of the lids. In three cases, closing of the lids could even produce the phenomenon in one eye. Some people state that they feel the resistance when they attempt to close the eye. That the dropping of the eyelids in looking downwards is produced not only by gravitation and the anatomical connections of the levator palp. sup. and musc. rect. sup., but in the first place by a central nervous mechanism, is shown in the independent action of these muscles, for instance, during sleep, when the eyeball goes up although the lid falls, as well as in many cases of palsy of elevators of the eyeball where the lids can be well raised, while the eyeball does not follow the impulse.

The experiments of Sherrington[1] have shown that abduction of the eyeball is produced not only by active contraction of the musculus rect. extern., but also by active inhibition of the musculus rect. intern.; this can easily be demonstrated through cutting of the musc. rect. extern.; though the abduction is paralyzed, a convergent eyeball can be reduced to primary position. This experiment explains, furthermore, why we do not find squinting as a consequence of congenital abducens palsy. In the same manner, looking downward is not only produced by active contraction of rect. inf. and obliquus sup. but also by active inhibition of rect. sup. and levator palpebræ sup.; this is best illustrated in cases of facialis palsy, where the eye cannot be voluntarily closed, and where, nevertheless, in looking downward the lid involuntarily drops in the same degree as in normal people. If such inhibition does not take place, retraction must follow. This is another and the chief reason why the Jaw Winking Phenomenon is not to be seen when the patient looks upward. Very convincing, in this direction, is the case of Zimmermann, who saw the phenomenon in an eight-months-old child, during suckling, and where unilateral retraction of the lid ceased when the attention of the child was attracted by an object held before him and moved upwards, though the child continued to drink.

We have seen before that the Jaw Winking Phenomenon is probably not caused by interruption of the aberrant pyramidal fibers, and we may therefore conclude that it is produced by a difficulty of the inhibition path traveling in the fasciculus long. post. That in this important association bundle inhibition paths are to be found, is shown by observing, for instance, that during closure of the eyelids by innervation of the facialis, an active relaxation of the levator palpebræ takes place. To the same group of observations pertains the relaxation of the levator palpebræ in normal abduction of the eyeball. If we accept, as the cause of the Jaw Winking Phenomenon, interruption or congenital aplasia of such an inhibition path existing normally in all men, and traveling in the fasciculus long. post., we could explain: (*a*) The unilateral appearance, because the chief connection of the nuclei in this bundle is a homolateral one, according to anatomical investigations. In its favor we have

[1] *The Integrative Action of the Nervous System*, 1906.

further the physiological experience of Sherrington, who tells us "that the march of the spinal reaction tends to transgress the median line more than does that of a cortical reaction, which tends rather to spread unilaterally." (*b*) It would best explain the association of the Jaw Winking Phenomenon with the different brain nerves, V, VI, VII, IX, X, XII. (*c*) The sudden appearance in acquired cases; that it can become worse, better, or disappear. (*d*) That it can be associated with or without any nuclear palsy of other eye muscles. (*e*) That the pupillary fibers function normally. (*f*) That the infranuclear path of the levator functions during retraction. (*g*) That the Jaw Winking Phenomenon could be produced voluntarily without any mastication movement, in one of my patients, simply through intense downward looking. (*h*) In favor of it we can further take into consideration its appearance in different members of the same family.

There remains to be explained how retraction of the upper eyelid can appear in the recovery from a fascicular lesion of the oculomotorius. We remember the conclusion of Eppenstein[1] that in these acquired cases the retraction of the upper lid is connected with the innervation of internus and rect. inf., *i.e.*, with movements which are normally accompanied by a relaxation of the levator palpebræ. It has been demonstrated that after the interruption of a branchial nerve, retrograde degeneration follows, with changes in the motor cells of the neuron. We can accept that these degenerations produce a suppression of the inhibition mechanism and that the nervous impulses irradiate to ganglion cells to which normally they should not go. Sherrington showed that inhibition and irritation follow probably the same path and that the difference is probably caused by colloid changes in the separating membrane between the dentrites of the ganglion cell and the termination of the afferent fibers. This inhibition mechanism is easily altered by abnormally strong irritations, and by some poisons,—strychnine, and tetanus, as well as by heat. Inhibition represents a higher function in a neuron chain, and is first destroyed by these poisons. They can even convert inhibition into irritation. This can be illustrated through the tetanic trism: opening of the mouth is produced by active

[1] *Kl. Monatsbl. f. Aug.*, 1913.

irritation of mylohyoides and biventer (trigeminus) as well as by active inhibition of the far stronger muscles masseter and temporalis (trigeminus). In tetanus this normal inhibition is changed into irritation, and for this reason the mouth cannot be opened. This would lead us to accept a lesion of the inhibition mechanism and subsequent reversion of the inhibition into irritation, as a consequence of retrograde degeneration in acquired cases, and to accept a congenital weakness or aplasia of the inhibition mechanism in cases of congenital hypoplasia of the nuclei, for the congenital Jaw Winking Phenomenon. The lack of development of the nuclei in cases of congenital palsy has been anatomically proven by Wilbrand-Sänger, as well as by Déjérine. The normal impulse going to the different bulbar nuclei would consequently not be accompanied by a normal active inhibition of the levator palpebræ, but by an abnormal irritation, as in tetanus poison. We could further accept that the paretic rect. sup. does not show contraction at the same time, because such an abnormal function is paralyzed by the stronger action of the healthier antagonist.

The foregoing clinical comparisons and considerations induce me to believe that the Jaw Winking Phenomenon, in its congenital as well as in its acquired form, is not produced by supplementary fibers of the levator palpebræ sup. originating in other bulbar nuclei, nor that it is produced by abnormal growth of the infranuclear fibers of the roots or of the oculomotor nerve itself; neither that it is produced by such abnormal regenerating of the aberrant fibers of the pyramidal tract, whether they come down from the cortex, as for example in voluntary closing of the eyelids or in involuntarily looking downward, or whether they come down from the thalamus opticus (principal movements), or whether they come down from the nuclear ruber (inferior bulbar reflex movement).

I think that the Jaw Winking Phenomenon is produced by alterations of the supranuclear connections of the bulbar nuclei traveling in the fasciculus long. post., and probably by a lesion of the inhibitive mechanism, just before the dentrites of the damaged nuclear cells of the nervus oculomotorius. The palsy of the other eye muscles, which so often accompanies the Jaw Winking Phenomenon, is then caused by lesions of the

nuclei themselves, or of the last unilateral part of the afferent or efferent fibers.

A similar concomitant movement of the lower eyelid has been observed by Herbert Robson (*Lancet*, 1907): "Associated movements of the lower lid with the tongue and lower jaw observed in certain diseases": the phenomenon consists in a slight eversion of the lower eyelids which are displaced about two milimeters from the eyeballs; it is made evident upon protusion of the tongue or depression of the lower jaw, the lids resuming their normal state when the tongue is retracted or the mouth shut. It is in the rule observed in both eyes. It is never present in healthy persons; it comes and goes with the onset and cure of cardiac and abdominal diseases or severe headaches.

I take pleasure in thanking Prof. Dr. José Valdés Anciano, for kindly placing his ample library at my disposal.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

PRESIDENT, J. B. STORY, F.R.C.S.

ANNUAL CONGRESS, 1919

The next annual Congress of the Society will be held on Thursday, Friday, and Saturday, 1st, 2d, and 3d of May, 1919.

The arrangements will be as follows:

THURSDAY, MAY 1st.

(At the Royal Society of Medicine, 1, Wimpole Street, W.)

MORNING.		**President's Opening Address.**
10 A.M. to 12.30 P.M.	...	Papers.
AFTERNOON.		
2.30 P.M.	... ...	Discussion on "Visual Requirements of Aviators." To be opened by Prof. SPEARMAN, Col. WILMER, U.S.R., and Mr. A. R. BRAILEY. The following members have also signified their intention of taking part in the Discussion: Messrs. E. C. CLEMENTS, A. B. ROXBURGH, Col. W. T. LISTER, and Col. J. H. PARSONS.

4.30 P.M.	Business Meeting.
5 P.M.	Tea.
5.30 P.M.	Bowman Lecture. Prof. V. MORAX. Subject: "Plastic Operations on the Orbital Region, including Reflection of the Orbital Cavity, Eyebrows, and Eyelids."
	Members will dine together in the evening.

FRIDAY, MAY 2d.

MORNING.	**Visit to the Day Blind School, Brecknock Road, Camden Road, and the Myopia School, Exmouth Street, Hampstead Road, N. W.**
10 A.M.	Discussion on "Eyesight in Connection with Education." To be opened by Messrs. JAMES KERR, W. G. SYM, and N. B. HARMAN. The following have also signified their intention of taking part: Messrs. T. HARRISON BUTLER, J. H. FISHER, R. B. HIRD, PERCIVAL J. HAY, A. L. WHITEHEAD, and L. PATON.
AFTERNOON.	
3.30 P.M.	**Visit to the Wellcome Museum, 54, Wigmore Street, W. 1.**
8.30 P.M.	Papers.

SATURDAY, MAY 3d

MORNING.		**At the Central London Ophthalmic Hospital, Judd Street, St. Pancras.**
10 A.M.	... ...	Clinical Meeting. Members are invited to send cases, and beds will be provided in the Hospital by the Staff as far as possible for those coming from the country.

Members desirous of reading Papers, showing Cases, or taking part in the Discussions are requested to communicate as soon as possible with Mr. M. S. MAYOU, 59, Harley Street, London, W. 1.

Papers and Communications, subject to the judgment of the Council, will be printed in full in the "Transactions."

Under the By-laws readers of Papers must not exceed twenty minutes, subsequent speakers ten minutes. The openers of the Discussions are allowed twenty minutes.

All Communications must be typewritten.

A Museum will be held at the Royal Society of Medicine with a Special Exhibition of Optical Glass and Glass Eyes. Members wishing to exhibit Drawings, Specimens, or Instruments should communicate with Mr. R. R. JAMES, 6, Lower Berkeley Street, London, W. 1.

M. S. MAYOU
R. R. JAMES } *Hon. Secs.*

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By JOHN M. WHEELER, M.D., Secretary.

MONDAY EVENING, NOVEMBER 18, 1918. MARTIN COHEN, M.D., CHAIRMAN.

Dr. JOHN R. SHANNON presented a patient, age 9 years, who had had **congenital dislocation of both lenses.** The left lens was removed a year ago by Dr. Webster, and the result was good although there was some membrane in the pupil, and the pupil was irregular in shape.

Dr. Shannon made four attempts to needle the right lens, but obtained no result, the lens continuing perfectly transparent, and did not swell. The zonule was so tenuous that the lens was frequently found in the anterior chamber, from which it was extracted after preparation by contracting the pupil with eserine behind the lens. Keratome incision was then made, after enlarging with scissors, and the lens drawn out with a sharp Tyrrell hook. The boy made an uninterrupted recovery.

In the discussion of Dr. Shannon's case Dr. LAMBERT reported the cases which he had operated on—in all six eyes—the operation being repeated needling. The result in all of these cases was eminently satisfactory. Vision in one case being $\frac{20}{30}$ O. U.; another case $\frac{20}{30}$ and $\frac{20}{40}$; and $\frac{20}{40}$ in the third patient.

Dr. KNAPP said that he had operated on a little girl 3 years old in whom the lens was caught in the pupil and partly dislocated into the anterior chamber. The patient had symptoms of glaucoma and a linear extraction was performed with success. The lens was almost globular in shape. In the other eye the iris is tremulous. There was no history of traumatism.

Dr. WEEKS was inclined to think that the dislocation in Dr. Knapp's case was traumatic. He said that he knew of no case on record of congenital dislocated lens in only one eye.

Dr. R. G. REESE presented a case of **restoration of both lids with Wolff graft.** The patient was a man, age 35, with cicatricial ectropion of both lids. All scar tissue was excised and the lids sutured together by Hunter's method. The denuded area was covered with a Wolff graft from the arm. The result was very satisfactory and cosmetically better than the other eye, which was similarly affected and had been operated upon with a pedunculated flap from the forehead.

Dr. JOHN E. WEEKS reported two cases of **homonymous quadrant defects of the fields of vision.**

Case I. E. F. A. was seen on June 14, 1917, with an alternating divergent strabismus of approximately 35 degrees and a vertical error of 1½ degrees. There was no annoyance from diplopia. Vision of $\frac{2}{2}\frac{0}{0}$ in each eye. Patient suffered from facial paralysis eight months previously, traces of which remain. There was a history of intraocular hemorrhage in the right eye one year ago, which cleared rapidly, and a hemorrhage in the left eye six weeks ago. Remnants of hemorrhage in the left eye were present in the upper outer quadrant of the fundus; optic disks and fundi, other than as noted, in good condition, except that there was a moderate degree of arteriosclerosis. Blood-pressure 180 systole. Fields of vision normal, except for a relative scotoma in the inferonasal quadrant of the left eye corresponding with the lesion in the fundus of that eye.

On September 14, 1918, vision was $\frac{2}{2}\frac{0}{0}-$. The exophoria of 35 degrees was converted into an esophoria of ½ degree. There was no vertical error. Ten days before the patient had had an attack affecting his speech and his vision. He remained at home for a week, then gradually resumed his former habits of life. On measuring the fields of vision an absolute scotoma was found in the right inferior quadrant of both fields with a relative defect extending through a sector of about 30 degrees above the horizontal plane in the upper right quadrant of both fields.

The fields have not changed since first observed. The diagnosis in that case is a subcortical lesion, either a thrombus or hemorrhage affecting the optic radiations on the left side

in their dorsal aspect, almost entirely, the lesion being located quite close to the cortical visual area.

Case II. H. P. B. was seen on August 8, 1918, stating that six months ago he had had an apoplectic stroke which produced a disturbance of vision, amnesia, and some amnesic aphasia. There was no agraphia, no facial paralysis, no hemiplegia. An incipient cataract reduced the vision to $\frac{2}{3}\frac{0}{0}-$ in the right eye and $\frac{2}{2}\frac{0}{0}\frac{0}{0}-$ in the left eye. Blood-pressure 120 systole. Arteriosclerosis, quite marked in the retinal vessels. Very slight changes at the maculæ. The fields of vision showed a defect in the upper right quadrant of both fields, not reaching to the center and shading off gradually toward the periphery below the horizon. On November 14, 1918, the fields of vision were unchanged.

The diagnosis in this case is a subcortical lesion on the left side affecting the optic radiations, particularly in their lower aspect, not involving the macular bundle of fibers, but extending into and affecting a portion of the fibers in the upper part of the bundle, the lesion being further removed from the cortical visual area than in the first case. The history in this case points to hemorrhage.

Dr. LESZYNSKY said that the opportunity to present a report of two cases showing a homonymous quadrant defect was unusual, as such cases are not common. The cerebral localization of the lesion in the optic tract is entirely dependent upon the associated symptoms indicating involvement of other tracts or centers. It is probable that in one of the cases there had been a small hemorrhage in the occipital lobe affecting either the optic radiations or the cuneus, thus producing a homonymous hemianopsia, and that the present quadrantic defect remained, after restitution of function in the other quadrant of the hemianopic field.

An analogous condition is not uncommon in cerebral hemorrhage into the internal capsule. The resulting hemiplegia may be complete at first, but within a few hours or days recovery of the lower extremity takes place, the upper extremity remaining permanently paralyzed. This is due to the accompanying cerebral œdema, which by pressure has temporarily interrupted the conductivity of the fiber tract to the leg, while the continuity of the path to the arm has been destroyed.

Dr. L. W. CRIGLER reported a case of **late infection following trephining for buphthalmos.** Lillie M., age 20; since infancy the right eye has been buphthalmic. There was a gradual increase in the size of the eye associated with increased tension and periodic attacks of pain until three years ago when a trephining was done by Dr. Wootton. Subsequent to the operation, the eye although totally blind was free from pain and increased tension. On September 23d last, the eye suddenly became inflamed. Two days later she presented herself at the hospital. On examination a yellowish white subconjunctival exudate, occupying the site of the trephine hole, was seen. The ocular conjunctiva as well as the deep ciliary vessels were very much engorged. The conjunctiva was œdematous and the upper lid was somewhat swollen. Hypopyon of moderate degree was present. There was no abrasion of the cornea. The hypopyon seemed to have been the direct result of the inflammation extending through the trephine hole, as there was a distinct line of exudation from the trephine opening to the bottom of the anterior chamber. Enucleation was advised and the eyeball removed one week from onset of inflammation.

The specimen shows, aside from the exudate in the anterior chamber, a mass of exudation in the anterior part of the vitreous which is probably from the ciliary body. The character of the infection was not determined. It is possible that it may not have been so virulent as to have destroyed the eye, but inasmuch as the inflammatory symptoms were not subsiding, enucleation seemed indicated.

Dr. CRIGLER presented a macroscopic specimen of an eye showing **a mass of subretinal exudate.** He had observed the eye before removal from the time vision first became affected until secondary glaucoma made enucleation necessary. On two different occasions the case had been shown to the section. Previous to the onset of secondary glaucoma the retina could be seen to be totally detached and this complication was anticipated. The ophthalmoscopic picture was typical of that type of retinitis described by Coates as "Retinitis Exudativa" and Hippel as "Angiomatosis Retinæ." In none of the reported cases has the exudate been so extensive as in this case. The disease is rare and the cause unknown but when the

picture is once seen and carefully studied it should not be confounded with any other. A histologic specimen will be presented at another meeting.

Dr. ARNOLD KNAPP presented a patient with a **quiescent foreign body in the retina of five months' standing.** F. R., aged 44, was seen November 11, 1918, on account of poor sight in the left eye. He stated that while cutting stone, something struck the left eye in July. He was treated at an eye hospital and nothing much was found wrong. Has had no further trouble with the eye, except that the sight is dim. To-day V. O. S. $\frac{15}{200}$. There is a linear wound in the center of the cornea and also of the anterior capsule of the lens, directly underneath. The rest of the lens is clear, except for a radiating opacity in the posterior cortex. This was suggestive of a penetrating injury, and upon examining the eyeground carefully, a very distinct foreign body could be seen in the macular region in the retina. Repeated attempts with a magnet have failed to dislodge the foreign particle which is believed to be firmly wedged in the sclera. The eye is free from irritation and does not present any signs of siderosis.

In connection with Dr. Knapp's case of foreign body in the globe Dr. LAMBERT reported a similar one which he now has under observation and which he expected to present at the meeting. The injury occurred about six months ago. The wound of entrance cannot be found; the media are perfectly clear; a foreign body can be distinctly seen projecting from the choroid into the vitreous. There is an atrophic area surrounding the location of the foreign body—otherwise the fundus seems fairly normal, and there is no evidence of siderosis. The patient has a high degree of compound hyperopic astigmatism, and with the correction has $\frac{20}{200}$ vision. The propriety of removing the foreign body is being considered.

In discussing these cases Dr. WEEKS suggests an X-ray examination, and the application of magnetic force near the equator to dislocate the foreign body if possible and then it could be drawn forward. If it cannot be dislocated Dr. Weeks would leave it alone and watch for siderosis and contraction of the field.

Dr. ELLICE M. ALGER presented an **instrument to assist in detection of malingerers.** There are two distinct types of

test for malingering; one, and by far the most valuable, which aims to reveal the exact vision in each eye; and the other, very much less important, which is intended chiefly to impugn the honesty and credibility of the witness. For instance, the various diplopia tests with candles are intended to show that a man who claims blindness in one eye is not coming into court with clean hands, but even in civil practice they do not exclude a functionally useless eye, while in military practice they are of no practical value at all. Of much more importance are the relatively few tests which indicate a definite amount of vision in each eye, most of which unfortunately are restricted to near vision and are therefore of no military value and of lessened civil use. The common element in all these tests is that they persuade the malingerer that he is seeing with one eye while he is really using the other.

Dr. Alger's device consists of two short parallel cylinders (four inches by one and one half) arranged opera-glass fashion. The distal end of each is closed by a revolving cap, which contains a small aperture (*6mm*), displaced slightly from the center. The patient looks through the instrument as he would a field glass, with both eyes open, at two ordinary test charts twenty feet away and about two feet apart. When the caps are so rotated that the apertures are approximately the same distance apart as the patient's pupils, a ***homonymous diplopia*** is caused, the right card being visible to the right eye and the left to the left eye.

When the openings are arranged so that their interval is slightly less than the interpupillary distance, both eyes can converge slightly and focus on the same chart, giving real ***binocular vision.***

When the openings are approximated still more so that their interval is considerably less than the interpupillary distance, the right eye falls on the left card and the left eye on the right, causing a ***crossed diplopia*** while the patient, as he looks from one card to the other, has the sensation of using the right eye when he is really using the left, and vice versa.

This impression is heightened by the fact that the apertures are "crossed" so that a card placed over what seems to be the right hole actually blocks the left eye.

If two identical charts are used many patients will fuse

them, just as with a weak prism, and see only one card. If extra letters are interpolated on each card, the malingerer will often read them all as though they were on the same card, thus proving binocular vision.

Dr. MARTIN COHEN presented a **device for examining aviators for distant stereoscopic vision** (published in this issue).

In the discussion Capt. HARVEY J. HOWARD said: "The piece of apparatus shown to-night by Dr. Cohen is to me of unusual interest because my problem for the past month at the Medical Research Laboratories has been 'depth perception.' We have also concluded that it would be of advantage to have a stereoscope which could be used at a distance of six meters and over. To this end I have constructed a modified form of the distance stereoscope proposed by Dr. Brooksbank James in the *Lancet*, June 20, 1908.

"The apparatus consists of three sides of a box, the front, back, and bottom, with a rectangular window in the front wall through which two vertically placed rods or wooden dowels are viewed at varying degrees of depth differences and upon which artificial light is so cast that the illumination of the two rods is equal. In brief, the effort is made to rule out all the criteria (which in nature so often help us to rightly judge size and distance) other than the one of the stereoscopic parallax which is obtained only through employing binocular vision. The relative value of accommodation and convergence, about which there is no consistent agreement, is for all practical purposes disregarded in this experiment.

"James, starting from the basis that normal individuals perceive distinctly the $\frac{6}{6}$ Snellen type, which at 6 meters subtends a visual angle of 5′, and its individual components an angle of 1′, concluded that the parallax angle for normal individuals also should be 1′. From mathematical calculation he found that such an angle required a depth difference of 180*mm* when the nearer object was 6 meters distant.

"The results of our experiments thus far have shown that James's estimate was far too large, for we have found that normal individuals are able to perceive a depth difference of 30*mm*, *i.e.* a parallax angle of only 10″ instead of 60″.

"For field work we are now constructing an apparatus which

may be used at 100 meters or so. It consists of a number of white painted semaphores of different sizes which are viewed over the top of a screen, the background being rising ground.

"The whole subject of stereoscopic vision is of great interest to us at present because of the generally accepted view that aviators must possess this power with at least normal facility. It is significant that in summing up the causes of the 'crashes' that have occurred in America at the various flying fields, the excuse most often given was that the flier 'misjudged the distance' in the act of landing."

Dr. ARNOLD KNAPP presented a **microscopical specimen of carcinoma of the lacrimal gland** (appears in this issue).

Dr. R. G. REESE reported a case of **tumor of the orbit**. A woman, age 37, had gradually increasing exophthalmos for three years. Macroscopic specimen presented showed the tumor had invaded the orbit and surrounded the upper and outer side of the globe. Microscopic section showed adenocarcinoma of the lacrimal gland.

BRITISH REPORT ON STANDARD ILLUMINATION OF TEST TYPES.[1]

(With one illustration in the text.)

THE effect upon visual acuity of variations in the illumination of test objects has been the subject of a series of careful investigations since the time of Tobias Mayer (1754). Two chief facts emerge from these researches: (1) that there is a rapid rise in acuity as the illumination is increased from zero up to about two foot candles[2]; (2) that above two or three foot candles there is scarcely any appreciable rise in acuity. The results obtained by different observers are not entirely concordant, the discrepancies being attributable to variations in the test object, contrast, size of pupil, etc. So far as the testing of visual acuity for clinical purposes is concerned, it appears to be sufficiently accurate to regard the results obtained with an illumination of three foot candles or more as valid and comparable under the ordinary conditions of clinical testing.

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[1] Report of a committee to determine standards of illumination for Snellen's test types of distant vision. This committee consists of the following members who were appointed by the Council of British Ophthalmologists, representing the Ophthalmological Society of the United Kingdom, the Section of Ophthalmology of the Royal Society of Medicine, and the Oxford Ophthalmological Congress: Sir George Berry (Chairman), Sir Richard Glazebrook, C.B., F.R.S. (Director of the National Physical Laboratory), Mr. C. C. Paterson, O.B.E. (National Physical Laboratory), Mr. Leon Gaster (Secretary of the Society of Illuminating Engineers), Mr. J. Herbert Fisher, Col. J. Herbert Parsons, Mr. A. B. Cridland, and Mr. W. H. MacMullen, O.B.E. (Secretary).

[2] One foot candle is the illumination received from a source of one candle power falling perpendicularly on a surface at a distance of one foot from the source.

There is, however, no doubt that this minimum is by no means always ensured under the actual conditions in which the testing of candidates for military or other public services occurs. Apart from the fact, which should be borne in mind, that the test types often do not conform to Snellen's criteria, they are frequently dirty, thus diminishing contrast, are varnished, thus giving rise to disturbing direct reflection of light, and are viewed under very great variations of daylight, in rooms which are often ill-suited for the purpose.

It is possible to lay down precise and simple rules for the efficient illumination of test types, and we see no reason why these rules should not be generally adopted. For the public services it is in our opinion unfair to the candidates and detrimental to the services themselves that the examinations should take place under unsatisfactory, and often hurriedly improvised, conditions. The testing of visual capacity is now an essential part of the physical examination of candidates for a large number of the public services, such as the Navy, the Army, the Mercantile Marine, the Indian Civil Service, and so on. We are of opinion that these tests should be conducted under approved conditions, and that this object would be best attained if the examinations were held at properly equipped centers.

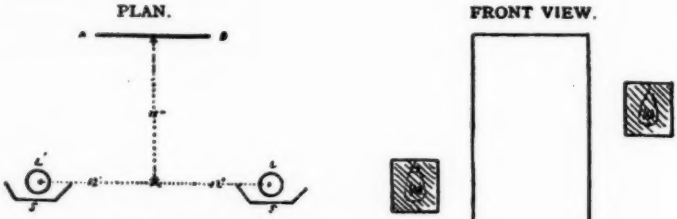
We fully recognize that variations of visual acuity arise from many causes other than the actual illumination of the test types, such as the condition of retinal adaptation, contrast between the test object and its background, the size of the pupil, lateral illumination, and so on. We think, however, that these effects can be minimized sufficiently for practical clinical purposes if the testing takes place in a moderately well illuminated room, with the test types efficiently lighted, and with the careful elimination of any glaring lights or bright objects from the candidate's field of vision.

We consider that the requirements are sufficiently well-satisfied by the following means:

Two ordinary 20-watt tungsten lamps with straight filaments are fixed vertically fifteen inches in front of the plane of the test card, one on each side, at a horizontal distance of twelve inches from the vertical plane normal to and bisecting the card. One lamp is placed higher than the other, one being opposite the

junction of the upper and middle thirds of the card, the other opposite the junction of the middle and lower thirds. Opaque non-reflecting screens are fitted, so as to prevent direct light from the lamps reaching the candidate's eyes.

The accompanying diagrams illustrate the arrangement recommended.



This method ensures:

(1) Sufficient illumination. With new lamps the illumination on the test types will be of the order of ten foot candles. The ordinary variations of current, deterioration of lamps, and the darkening of the test card with age will not reduce the brightness of the test card so illuminated to a value less than that of a perfectly white surface receiving an illumination of three foot candles.

(2) Sufficient uniformity of illumination. Whilst we are aware that the same result can be achieved by the employment of properly designed and carefully placed reflectors we have had to recognize in making these proposals that the testing of visual acuity must often be carried out in circumstances which do not admit of the use of special lighting arrangements, requiring technical skill in their installation or upkeep. We have, therefore, endeavored to prescribe a method of ensuring the necessary illumination which is simple to erect, is not liable to become deranged by subsequent treatment, and which enables ordinary lamps on the market to be employed.

Where electric light is not available a similar arrangement can be installed, using other illuminants (see appendix).

Daylight Illumination.—There is no theoretical objection to

the use of diffuse daylight so long as the illumination on the test types is adequate, *i. e.*, does not fall below three foot candles. In cases of doubt, it would be necessary to apply tests requiring the skilled use of some form of photometer. We are therefore of opinion that, in order to secure uniformity and comparable results, artificial illumination should in general be used, and invariably in testing for the public services.

We therefore make the following recommendations:

I. *The Test Types.*—The test types shall be of the dimensions laid down by Snellen, and printed on a matt white surface.

II. *Illumination.*—

a. The minimum illumination on the test card shall be such that its brightness shall be equivalent to that of a new card illuminated to at least three foot candles;

b. The illumination of the test types shall be as uniform as possible;

c. Artificial illumination shall be used in preference to daylight;

d. The testing room shall be moderately illuminated, and care shall be taken that there are no glaring lights or bright objects in the candidate's field of vision;

e. Extreme contrast between the illuminated test card and the background shall be avoided.

III. *Method of Lighting.*—

a. The method of lighting described in this report shall be in general adopted;

b. This method shall be made compulsory for sight testing in all public services.

APPENDIX.—ILLUMINATION OF TEST TYPES BY GAS OR OIL LAMPS.

Gas Lighting.—Two "medium" inverted incandescent burners, consuming 2½–2¾ cub. ft. of gas per hour, are fixed 2½ ft. in front of the test card, one on each side, at a horizontal distance of 12 inches from the vertical plane, normal to and bisecting the card. One burner should be higher than the other, one being opposite the junction of the upper and middle thirds of the card, the other opposite the junction

of the middle and lower thirds. Burners should be equipped with clear glass globes, and care should be taken to ensure, by regular maintenance, that mantles and burners are kept in good order and in clean condition. Opaque non-reflecting screens are fitted, so as to prevent direct light from the burners reaching the candidate's eyes.

Oil Lighting.—Two standard "Duplex" oil lamps, each having a double straight wick, 1 inch in width, and a chimney 10½ inches in length, are fixed 2 ft. in front of the test card, one on each side, at a horizontal distance of 12 inches from the vertical plane, normal to and bisecting the card. One lamp should be higher than the other; one being opposite the junction of the upper and middle thirds of the card, the other opposite the junction of the middle and lower thirds. The wick should be turned up as high as is possible without smoking, and the face of the wick should be turned towards the card. The distance from top of wick to level of oil in reservoir should not exceed 5 inches. The lamp should be lighted twenty minutes before the test, so as to ensure steady conditions of burning. Opaque non-reflecting screens are fitted, so as to prevent direct light from the lamps reaching the candidate's eyes.

REPORT ON THE PROGRESS OF OPHTHALMOLOGY FOR THE FIRST, SECOND, AND THIRD QUARTERS, 1918.

By H. KOELLNER, Berlin; W. KRAUSS, Marburg; R. KÜMMELL, Erlangen; W. LOEHLEIN, Greifswald; H. MEYER, Brandenburg; W. NICOLAI, Berlin; H. PAGENSTECHER, Strassburg; K. WESSELY, Würzburg; and M. WOLFRUM, Leipsic; with the Assistance of Drs. ALLING, New Haven; CALDERARO, Rome; CAUSÉ, Mayence; CURRAN, Kansas City; DANIS, Brussels; GILBERT, Munich; GROENHOLM, Helsingfors; v. POPPEN, Petrograd; TREUTLER, Dresden; and VISSER, Amsterdam.

Edited by MATTHIAS LANCKTON FOSTER, M.D., F.A.C.S., New Rochelle, N. Y.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

1. DANIS, M. **War and night blindness.** *American Journal of Ophthalmology*, July, 1918.
2. DUVERGER. **Two months of ophthalmological practice on urgent cases in evacuation hospitals.** *Annales d'oculistique*, cliv., 10.
3. KALT, M. **Multiple exostoses on the skull of a boy.** *Annales d'oculistique*, cliv., 12.
4. WEEKERS, L. **Organization of the ophthalmological service in the Belgian army.** *Annales d'oculistique*, cliv., 10.

DANIS (1, **War and night blindness**) has studied this defect among Belgian soldiers. He finds it a well-established affection. The night life of the soldier develops a number of those who have congenital hemeralopia but errors of refraction and cloudy media may be the cause. It seems probable, however, that the strenuous activities incident to the war with its mental and physical strain cause night blindness by disturbing the circulation in the choriocapillaris and interfering with retinal adaptation.

ALLING.

KALT'S (3, **Multiple exostoses on the skull of a boy**) patient had a number of exostoses of the orbital margins, inferior maxilla, frontal and parietal bones, etc. The author does not give the other clinical features and the serological findings.

SCHOENBERG.

WEEKERS (4, **Organization of the ophthalmological service in the Belgian army**) emphasizes the importance of having an ample supply of ophthalmologists attached to the Medical Corps.

SCHOENBERG.

DUVERGER (2, **Two months of ophthalmological practice on urgent cases in an evacuation hospital**) says that there is a very great demand for a well-trained ophthalmologist at an evacuation hospital. In one single day, following an attack, he has seen eleven cases of perforating wounds of the eyeball and thirty wounds of the orbits and lids. Such cases need immediate and proper attention by a skilled ophthalmologist. He classifies the eye cases in two groups: (1) Injuries of the eyeballs; (2) injuries of the tissues surrounding the eyeballs. One of the most important kind of cases belonging to the second group is that of fractures of the base of the skull with subconjunctival hemorrhage and obscure clinical symptoms. The ophthalmologist should be on the lookout for such cases; a lumbar puncture will establish the diagnosis and prevent the removal of such a case to some distant place and the exposing of the wounded to undue strain.

The wounds of the orbits and lids with intact eyeballs are usually benign. They do not usually become infected. Wounds of the lids are to be treated along the usual lines: excision of the fringes of tissue, approximating and suturing the lips of the wounds.

The wounds of the conjunctiva of the fornix and of the eyeball have to be carefully searched for the presence of a foreign body in the orbit or a tear in the sclera. After the removal of the foreign body the tear is sutured and symblepharon prevented by sliding a flap of conjunctiva prepared from the immediate vicinity.

Patients with intraorbital conditions and with characteristic symptoms (exophthalmus, chemosis, œdema of the lids, disturbances of motility of the eyeball, diminution of vision),

present two main problems for elucidation: (1) The presence of a foreign body; (2) the fracture of one of the walls of the orbit. The superior wall is the most important, on account of its relations to the cranial fossa and brain.

If the X-ray study of the case reveals no foreign body the treatment is conservative. If there is a foreign body, as small as a pea, the expectant policy is yet to be preferred. Larger foreign bodies are to be immediately extracted, *not* through the conjunctival wound, which when enlarged and bruised by manipulations will eventually leave a bad scar, but through an incision in the skin of the lid on a line corresponding to the orbital margin. A good incision for a free access to the orbit is on a vertical line starting from the outer extremity of the eyebrow extending downwards one centimeter on the outside of the external commissure and curving towards the nose for about two centimeters along the lower orbital margin. This incision has the double advantage of avoiding the opening of the conjunctival sac and of sparing the facial nerve-fibers going to the orbicularis. The orbital periosteum is then easily separated up to the tip of the orbit and the finger introduced deep into the wound can feel the foreign body. If this fails the author advises the use of the fluoroscope.

Regarding perforating injuries of the eyeball the author recommends an optimistic policy as far as enucleation is concerned. He performed only four enucleations and six exenterations in one hundred cases of intraocular foreign bodies. The advantages of an immediate diagnosis and extraction of intraocular foreign bodies being universally agreed upon, the author recommends the installation of an X-ray department and electro-magnet in each evacuation hospital.

SCHOENBERG.

II.—THE EYE IN ITS RELATIONS TO GENERAL DISEASE.

5. DOR, L. **Optic neuritis of dental origin.** *Clinique ophtalmologique*, viii., 9.

6. DOR, L. **Thrombosis of retinal veins due to dental infection.** *Ibid.*

7. MARIN, M. **Papillary ectasis and lumbar puncture.** *La clinique ophtalmologique*, viii., 7.

8. TEAL, F. F. **A study of the eye in dementia præcox.** *American Journal of Ophthalmology*, March, 1918.

9. TYSON, H. H. **Report of a case of bilateral inferior hemianopsia.** *American Journal of Ophthalmology*, January, 1918.

10. YUDKIN, A. M. **Leprosy with especial reference to ophthalmologic findings.** *Ibid.*, May, 1918.

DOR (5 and 6, **Optic neuritis and thrombosis of the retinal veins of dental origin**) reports in these two papers the cases of three patients. Two of them had optic neuritis, the other a thrombosis of the retinal veins. He ascribes the condition in all three to a dental infection.

SCHOENBERG.

MARIN (7, **Papillary ectasis and lumbar puncture**) reports three cases of bilateral papillœdema, with amaurosis probably due to tubercular meningitis, in which vision returned and the œdema of the disks disappeared after a few lumbar punctures. He believes that the most frequent cause of papillœdema is tubercular meningitis and that the repeated extraction of spinal fluid acts favorably by relieving the intracranial pressure, reëstablishing a normal circulation and removing toxins.

SCHOENBERG.

TYSON (9, **Bilateral inferior hemianopsia**) examined a woman with albuminuric retinitis who had become suddenly blind four days before. He found swelling of the disk about 3 D. When last seen, nine years later, the nerves were white but vision had returned to R. $\frac{20}{40}$; L. $\frac{20}{30}$. The visual fields were contracted below to within 3° of the fixation point in each eye. The diagnosis was œdema of the third and fourth ventricles (serous meningitis) complicating nephritis and the inferior hemianopsia by a lesion of the upper surface of the chiasm. The fact that the patient had lived so many years is also of interest.

ALLING.

TEAL (8, **The eye in dementia præcox**) after reviewing the literature relates his own observations in the examination of fifty-three cases of dementia præcox as well as of thirteen cases of maniacal insanity. The most constant feature was dilated and tortuous retinal veins with contracted arteries. The disk at times was normal but in some cases there was more or less hyperæmia. He saw a few cases which showed the condition described by Tyson and Thomas, that is, the nasal side of the nerve congested and the temporal side pale. When it was

possible to take the fields they often showed contraction for form and color and interlacing of the color limits. In all the pupils were a little larger than normal and he noted absence of small normal iris movements. The sensory reflex was absent in 70%. There seems to be no fundus change pathognomonic for this condition but the pupil changes are quite constant.

ALLING.

The eye is very commonly affected in leprosy. The lids show either anæsthesia or nodules and the lashes are lost. The conjunctiva is often infiltrated with leprous nodules, but the sclerocorneal junction is the site of predilection, pale grayish-yellow elevations being the characteristic lesion. The cornea is anæsthetic and several forms of keratitis are found. The iris and ciliary body are occasionally involved and the ophthalmoscope may show white spots and disturbed pigmentation in the later stages. YUDKIN (10, **Leprosy with especial reference to ophthalmologic findings**) had the opportunity of studying two cases of the anæsthetic type in one of which changes in the lids, as well as sclerocorneal and corneal lesions were observed while the other had only nodules and anæsthesia of the lids. The acid-fast bacillus of Hansen was isolated in both cases.

ALLING.

III.—PATHOLOGY AND BACTERIOLOGY.

11. GREENSPON, E. A. **A pathogenic bacillus subtilis isolated from the eye.** *American Journal of Ophthalmology*, May, 1918.

12. BONNEFON, G., and FROMAGET, H. **Researches on histological evolution of aseptic scleral resections.** *Annales d'oculistique*, cliv., 9.

GREENSPON'S (11, **Pathogenic bacillus subtilis isolated from the eye**) communication is based upon the examination of two cases of panophthalmitis following cataract extraction. Bacteriologic studies of the saline solution used in irrigation proved that it contained the same organism which was recovered from the infected eyes. The tubing and glass funnel were also tested and were likewise infected. A culture of the bacillus was injected into the anterior chamber of a rabbit's eye and produced a violent panophthalmitis. As the bacillus subtilis obtained from hay infusion was not pathogenic, it

seems therefore that only certain races of the organism are capable of producing suppuration.

ALLING.

BONNEFON and FROMAGET (12, **Researches on histological evolution of aseptic scleral resections**) have made a histological study of the wounds after scleral resections in rabbits with the object of possibly solving the question: Why a sclerectomy reduces the ocular tension in some glaucomatous eyes and fails in others? Their researches and a study of the reports on microscopic examinations of sclerectomized glaucomatous human eyes lead them to the following conclusions: (1) The loss of substance in the sclera—like that in the cornea—is cicatrized in the same manner. The fibrinous clot begins to organize about the third day and is gradually replaced by fibro-plastic cells. After two months the wound is completely closed by a more dense but less regular tissue. (2) This regeneration can be retarded or prevented only by the interposition of a heterogeneous tissue like uvea or conjunctiva. If the prolapsed tissue is impermeable (the uvea), the tension remains unchanged; but if it is permeable (the conjunctiva), the tension is lowered. (3) In no case did the wound remain open (fistulization) when there was no prolapse of tissue between its lips. The anatomopathological studies of human eyes, published mostly by Meller, agree with these experimental findings. They show that the scleral wound, even in old patients, closes up very rapidly and completely, if there is no prolapse of iris or conjunctiva.

SCHOENBERG.

IV.—INSTRUMENTS AND REMEDIES.

13. BAILLART, P. **The blood pressure in the branches of the central retinal artery; a new technique for its determination.** *Annales d'oculistique*, cliv., 11.

14. GROS, H. **Thermocautery handle.** *Clinique ophtalmologique*, viii., 8.

15. RICHARD, P. **Treatment of syphilis with galyl.** *Ibid.*, viii., 8.

GROS (14, **Thermocautery handle**) has devised a thermocautery handle consisting of two tubes of brass separated by a layer of asbestos, for which he claims the advantage of remaining cold for from ten to fifteen minutes. The picture and description of this handle lack in clearness.

SCHOENBERG.

RICHARD (15, **Treatment of syphilis with galyl**) confirms the favorable findings of a number of other authors.

SCHOENBERG.

BAILLART (13, **The blood pressure in the branches of the central retinal artery; a new technique for its determination**) says that the study of the artificially induced pulsations of the retinal arteries by pressure exerted upon the eyeball brings out two important facts: (1) The amount of compression exerted upon the eyeball to bring out the arterial pulse is equal to the diastolic blood pressure in the retinal arteries; (2) if the compression is continued until the pulsation stops entirely and then gradually released, until the arterial pulse reappears, the amount of compression at that instant is equal to the systolic blood pressure in the retinal arteries. The author has succeeded in constructing a small dynamometer which registers in grammes the pressure exerted. With this handy little instrument applied on the eyeball, a few millimeters above and temporally from the cornea, he presses on the eyeball (while watching the fundus by direct electric ophthalmoscopy) until the two phenomena of pulsation appear. The number of grammes indicated on the dynamometer translated into Hg. *mm* gives the systolic and diastolic blood pressure in the retinal arteries. He studied this subject in normal eyes and found that the diastolic pressure is about 25*mm* and the systolic pressure is 50*mm*. Whenever it is necessary to exert a pressure higher than 35 grammes to bring out the arterial pulsation and 80 grammes to stop it entirely there is a hypertension of the retinal arteries. In glaucomatous eyes, where the intraocular pressure is raised it was found that the blood pressure is also automatically raised and whenever the ocular tension is reduced by myotics or surgically the blood pressure in the retinal vessels is also diminished. This work, although at its very beginning, promises a series of fruitful informations on ocular physiology and pathology. SCHOENBERG.

V.—GENERAL TREATMENT AND DIAGNOSIS.

16. ABADIE, CH. **Continuous and prolonged mercurial treatment for grave forms of ocular syphilis.** *Annales d'oculistique*, cliv., 12.

17. DOMEC, TH. **The treatment of various ocular affections by hypodermic or intramuscular injections of sterile milk.** *Clinique ophtalmologique*, viii., 9.

18. Loeb, C. **Deep X-ray therapy in the treatment of tumors of the hypophysis.** *American Journal of Ophthalmology*, June, 1918.

19. Nicolle and Blaizot. **Preventive and curative bacteriotherapeutics by the use of atoxic and stabilized vaccines.** *Clinique ophtalmologique*, viii., 9.

20. Smith, A. S. **Importance of temperature curve for the early recognition of intraocular tuberculosis.** *American Journal of Ophthalmology*, February, 1918.

21. Tillot, E. **Ocular affections treated with the waters of Saint-Christau (Pyrénées Orientales).** *Clinique ophtalmologique*, viii., 8.

Abadie (16, **Continuous and prolonged mercurial treatment for grave forms of ocular syphilis**) is convinced that syphilitic optic nerve lesions and chorioretinitis can be arrested and even improved a great deal by intravenous injections of one centigramme mercury cyanide, every day or every other day for a long period of time. Improvement should not be expected during the first ten to twenty injections; results begin to show only after thirty to forty injections. The indication for the cessation of treatment is icterus, which signifies hepatic intolerance. The author has followed this treatment for the past twenty years and has seen cases keeping their vision as long as they received this line of treatment regularly.

Schoenberg.

Domec (17, **The treatment of various ocular affections by hypodermic or intramuscular injections of sterile milk**) has injected sterile milk under the skin or in the muscles of patients with chronic eczematous blepharitis, ulcers of the cornea, iritis, iridochoroiditis, etc., and obtained results far superior to any other methods he had used before for these affections. He recites a number of cases showing how apparently very serious conditions cleared up rapidly and completely after from one to four injections of milk. The dose used was 1*cc* in infants, 2*cc* in children, and 4–5*cc* in adults, administered at intervals of three to eight days apart.

Schoenberg.

Tumors of the hypophysis have from time to time been treated successfully by the X-ray. Loeb (18, **Deep X-ray therapy in the treatment of tumors of the hypophysis**) reports the case of a woman aged 38 who complained of increased weight and severe headaches with partial loss of vision. He found pale optic nerves and incomplete temporal hemianopsia.

The sella turcica was decidedly enlarged. In the treatment the X-ray was applied to parts of the skull which are nearest the hypophysis, an aluminum plate being interposed to cut out the less penetrating rays. Repeated doses were given to the production of an erythema. There were alleviation of the headaches and improvement in the visual fields.

ALLING.

NICOLLE and BLAIZOT (19, **Preventive and curative bacteriotherapeutics by the use of atoxic and stabilized vaccines**) say that microörganisms killed by heat or antiseptics for the preparation of vaccines undergo a gradual lysis in the course of time and their immunizing power is diminishing very rapidly. They have found that a fluoride of sodium solution acts upon the microörganisms in such a manner that, while killing them, it does not destroy their morphology for a considerable time. Thus, the microbes conserve their chemical make-up and are nearer to the living ones than the ordinary vaccines so far as their immunizing properties are concerned. They have succeeded in preparing preventive vaccines against typhoid, cholera, and dysentery and curative vaccines for gonorrhœa, staphylococcic and streptococcic infections, typhoid fever, dysentery, and pertussis. SCHOENBERG.

SMITH (20, **Importance of temperature curve for the early recognition of intraocular tuberculosis**) calls attention to a fact which should be always noted, namely that patients with tuberculous lesions of the fundus commonly have an afternoon rise of temperature of one or two degrees. ALLING.

TILLOT (21, **Ocular affections treated with the waters of Saint-Christau (Pyrénées Orientales)** says he has obtained good results by topical applications of the St. Christau waters in chronic blepharitis, trachoma, corneal opacities, and dacryocystitis. These waters contain iron and copper salts.

SCHOENBERG.

VI.—POISONS.

22. ELLIOT, R. H. **Quinine poisoning; its ocular lesions and visual disturbances.** *American Journal of Ophthalmology*, September, 1918.

23. KERSHNER, W. E. **Optic atrophy due to gassing.** *Ibid.*, March, 1918.

24. ROBINSON, J. M. **The toxic action of emetin on the eye.** *Ibid.*, April, 1918.

ELLIOT'S (22, **Quinine poisoning; its ocular lesions and visual disturbances**) paper is an analytic study of the literature combined with personal experiences. He points out the danger of mistaking the symptoms of quinine poisoning for those of malaria—an error which is frequently made.

ALLING.

KERSHNER (23, **Optic atrophy due to gassing**) reports the case of a soldier who had suffered from a gas attack in France. When he enlisted his left eye was defective with vision about $\frac{2}{8}$. At the time of the gassing he lost consciousness for about three hours and later found his left side nearly paralyzed. His vision was reduced to light perception for seven weeks but gradually improved to R. $\frac{2}{8}$ L. movements. The optic nerves were found atrophic with evidence of previous neuritis. The fields were contracted and the blind spot enlarged.

Whether the neuritis was caused by the effect of the gas upon the vasomotor system, by direct blood changes or through involvement of the sinuses it is not possible to state.

ALLING.

ROBINSON (24, **The toxic action of emetin on the eye**) prescribed homatropine but through a mistake of the druggist emetin was substituted. After about ten hours it produced congestion, smarting lacrymation, and photophobia. The same effect was noted when the drop was put into his own eye. The reviewer has seen a severe conjunctivitis and a small ulcer of the cornea produced by a minute quantity of a substance used by dentists which contains ipecac.

ALLING.

VII.—REFRACTION AND ACCOMMODATION.

25. OGATA, D., and WEYMOUTH, F. W. **Refractive differences in foveal and parafoveal vision.** *American Journal of Ophthalmology*, September, 1918.

26. ZENTMAYER, W. **Apparent accommodation in aphakia.** *Ibid.*, August, 1918.

The experiments outlined by OGATA and WEYMOUTH (25, **Refractive differences in foveal and parafoveal vision**) were suggested by the fact that one of the writers discovered that his refraction was less hypermetropic in a dim light. It was shown that somewhat less than one half of the individuals

examined had a difference of refraction from 0.25 D. to 0.5 D. between the foveal and parafoveal vision—always toward less hypermetropia and more myopia. It has been supposed that the enlargement of the pupil under these conditions would account for the varied refraction, but the authors believe that they have excluded this factor and they explain the phenomenon by the fact that the parafoveal region is more sensitive to light and is therefore used in the dark.

The difference in refraction about the macula may be explained anatomically by assuming a slight recession of the retina.

ALLING.

ZENTMAYER (26, **Apparent accommodation in aphakia**) relates the case of a girl 8 years old upon whom he has operated for cataract leaving a small opening in the remaining lens matter and capsule. The vision was good for both distance and near. After enumerating the possible explanations he concludes that the results were obtained by the pin hole effect of the small hole in the pupil which cut out the circles of diffusion.

ALLING.

VIII.—THE MOTOR APPARATUS OF THE EYE.

27. JACOBS, M. W. **Latent nystagmus.** *American Journal of Ophthalmology*, March, 1918.

28. LOEB, C. **Convergent strabismus treated by atropine and glasses, with some cases of heredity strabismus.** *Ibid.*, September, 1918.

29. SCHWENK, P. N. K., and POSEY, W. C. **Contraction of paretic external rectus muscle diminishing when masseters are contracted in act of biting.** *Ibid.*, June, 1918.

30. VAN DER HOEVE, I. **Latent nystagmus.** *Annales d'oculistique*, cliv., 12.

31. ZIMMERMANN, C. **Concomitant movements especially of the upper eyelid with suction.** *American Journal of Ophthalmology*, July, 1918.

JACOBS (27, **Latent nystagmus**) describes the case of a boy who was amblyopic in one eye, had a slight amount of hypermetropia but did not squint. When either eye was covered a marked horizontal nystagmus appeared. A supranuclear tonic association center as well as a clonic center are supposed to exist and the latter is constantly under the control of the former. In these cases it is thought that the control is defective.

ALLING.

LOEB (28, **Convergent strabismus treated by atropine and glasses, with some cases of heredity nystagmus**) presents a tabular report of twenty-nine cases showing the results of non-operative treatment. All but five were corrected or improved. There were twelve families which showed direct heredity, there being thirty-five children, fifteen of whom were affected. Seven families showed indirect heredity with twenty-four children, eight of whom had strabismus. Twelve families showed collateral heredity with forty-eight children and twenty-seven affected.

Collateral heredity therefore seems the most common occurrence.

ALLING.

SCHWENK and POSEY (29, **Contraction of paretic external rectus muscle diminishing when masseters are contracted in act of biting**) relate the interesting case of a man who had a severe injury with probable hemorrhage at the base of the skull and paralysis of the fifth and sixth nerves of the left side. Recovery took place in the fifth but there was total paralysis of the external rectus. When he closes his lower jaw in the act of biting the externus regains part of its activity. The phenomenon is explained on the supposition that some of the regenerating fibers of the trigeminus found their way into the abducens nerve. The anatomical connection between the two nerves would be from the fifth through the optic ganglion, Vidian nerve, Meckel's ganglion, cavernus plexus to the sixth.

ALLING.

VAN DER HOEVE (30, **Latent nystagmus**) reports the observations of six patients with nystagmus appearing only when either of the eyes was screened. He found the condition always bilateral. The acuity of vision is greatly reduced by the nystagmus; in the first patient from $\frac{6}{10}$ to $\frac{3}{60}$; in the third one from $\frac{5}{10}$ to $\frac{1}{10}$; in the fourth one, from $\frac{6}{100}$ to $\frac{1}{100}$; in the fifth case from $\frac{6}{9}$ to $\frac{6}{24}$; in the sixth case from $\frac{6}{9}$ to $\frac{6}{60}$, so that the binocular vision was 7, 5, 5, 3, and $3\frac{1}{2}$ times better than the monocular vision. The internal ear functions were found normal, Wassermann negative, the nervous system sound. In trying to explain the mechanism of latent nystagmus the author advances the following hypothesis: (1) Patients with this anomaly have their centers of associated movements of

the eyes in an unstable or labile equilibrium; (2) the left eye sends to these centers an impulse by which there is a tendency to move both eyes to the right, while the right eye sends an impulse to the same centers tending to deviate both eyes to the left.

In normal individuals the state of equilibrium of the centers of associated movements is stable, while in patients with a labile or unstable condition of equilibrium of these centers the mere screening of one eye disturbs the equilibrium of these centers to such a degree that the action of the seeing eye predominates; both eyes deviate to the opposite side. The power of fixation of the seeing eye replaces them in normal position, but the lack of central equilibrium deviates them again. In this manner we observe a continuous movement of the eyes, the result of a struggle between the tendency to fix and the impulse to deviate.

SCHOENBERG.

ZIMMERMANN (31, **Concomitant movements especially of the upper eyelid with suction**) observed a boy baby 8 months old who raised his right upper lid when drinking from a bottle, but this occurred only when he was looking down. The most plausible explanation seems to be that the nerves of the levator arise partly or exclusively from the nucleus of the motor part of the fifth which supplies the muscles of the jaw.

ALLING.

IX.—THE LIDS.

32. DEL MONTE, ALBERTO. **The ætiology and pathogenesis of chalazion. A summary of former researches and new observations.** *Annales d'oculistique*, cliv., 10.

DEL MONTE (32, **The ætiology and pathogenesis of chalazion**) summarizes his studies on the ætiology and pathogenesis of chalazion, published during the last few years in *Archivio di Ottalmologia*. He reaffirms his conviction that chalazion is produced by a protozoa which he has invariably found in the granular tissue of the walls of this little tumor. "The morphology is of unusual complexity and variety." The micro-organism consists of a cortical and nuclear portion and frequently contains hyaline granules. The author did not succeed in growing them on artificial media.

The chalazion commences as a primary lesion on the epithelial lining of a Meibomian gland followed by a reactive proliferation of the surrounding tissue. This constitutes the first stage (of short duration) succeeded by the second stage consisting of an extension of the process to the extraglandular tissue, when the parasite penetrates the tarsus.

SCHOENBERG.

X.—ORBITS, ACCESSORY SINUSES, EXOPHTHALMOS.

33. BEDELL, A. J. **A case of traumatic pulsating exophthalmos.** *American Journal of Ophthalmology*, May, 1918.

34. CAMPBELL, A. C. **Neurofibromatosis of the orbit.** *Ibid.*, August, 1918.

35. CHANCE, B. **A case of cavernous angioma of the orbit.** *Ibid.*, January, 1918. *Transactions American Ophthalmological Society*, 1917.

36. GIFFORD, H. **The treatment of blood cysts of the orbit.** *Ibid.*, September, 1918.

37. ORENDORFF, O. **Successful removal of a bullet imbedded in the orbit ten years.** *Ibid.*, February, 1918.

BEDELL (33, **Traumatic pulsating exophthalmos**) was able to watch his case from the first appearance of diplopia and exopthalmos which followed a blow on the right parietal region. Later the eye showed pulsation and a bruit developed. As the proptosis and ocular paralysis increased ligation of the internal carotid artery was done. The immediate result was a blanching of the fundus and a reduction of the exophthalmos. Although signs of cerebral œdema appeared the patient recovered with slight prominence of the eyeball and atrophy of the optic nerve.

ALLING.

CAMPBELL (34, **Neurofibromatosis of the orbit**) removed two tumors from the upper part of the orbit but was obliged to leave a third which was too deeply seated. The patient had had many operations for similar masses in different parts of the body. He complained of severe pain in the eye which was proptosed and pushed downwards. The nerve was slightly pale and veins a little enlarged but there were normal vision and motility. The operation relieved the pain and part of the exophthalmos but ten months later the eye was becoming more prominent.

ALLING.

CHANCE (35, **Cavernous angioma of the orbit**) operated on a

girl of 16 with a soft tumor mass occupying the upper half of the orbit. It was first noticed soon after birth and had grown to a size larger than an English walnut. Pressure on the jugulars increased its volume and in stooping and during excitement it protruded through the palpebral fissure. It was dissected out with some difficulty and was found to be adherent to the upper sclera.

ALLING.

GIFFORD (36, **Treatment of blood cysts of the orbit**) reports two cases in which the eye was pushed forward by an orbital mass which when exposed by removal of part of the outer orbital wall and proved to be cystic and lobulated. A brownish fluid filled the cysts. The cavities were swabbed out with phenol and alcohol. There was complete recovery in both cases. In a third case the orbit was opened in a similar manner and a pyramidal tumor removed. The exterior of the mass was irregular and when cut open proved to consist of connective tissue with pockets containing coagulated blood. In every case of deep-seated orbital tumor of uncertain nature the possibility of its being a blood cyst should not be overlooked.

ALLING.

ORENDORFF (37, **Removal of bullet imbedded in the orbit ten years**) made an incision along the outer margin of the orbit and separated the periosteum from the bone backward toward the apex keeping well in the superior part of the orbit. The .38 caliber bullet was found imbedded in the bone of the upper wall and was extracted with difficulty. Recovery was complete and the violent headaches and mental irritability, from which he had suffered, disappeared.

ALLING.

XI.—THE CONJUNCTIVA.

38. CONNER, R., and BURKHOLDER, C. A. **Pemphigus of the conjunctiva.** *American Journal of Ophthalmology*, August, 1918.

39. DARIER, A. **The value of gonococcic vaccine for purulent ophthalmia in adults.** *Clinique ophtalmologique*, viii., 9.

40. FERNANDEZ, J. S. **Conjunctivitis of the fornix.** *American Journal of Ophthalmology*, August, 1918.

41. KERSHNER, W. E. **Ætiological factors in an epidemic of acute conjunctivitis at Camp Sherman.** *Ibid.*, July, 1918.

42. SANTO FERNANDEZ, J. **Is trachoma curable?** *Annales d'oculistique*, cliv., 9.

43. SHUMWAY, E. A. **Vernal conjunctivitis greatly improved by radium treatment.** *American Journal of Ophthalmology*, June, 1918.

44. VAN SCHEVENSTEEN, A. **Hyaline degeneration of the caruncle and tarsal conjunctiva in an old trachoma patient.** *Annales d'oculistique*, cliv., 10.

CONNER and BURKHOLDER (38, **Pemphigus of the conjunctiva**) observed the case of a private in the United States Army who complained of frequent attacks of inflammation in his left eye during nine months preceding. The lower fornix was almost obliterated. While under treatment blebs which lasted about three days appeared on the ocular conjunctiva and left areas of ulceration. No similar lesions showed in the other eye or in other parts of the body. When discharged from the army the eye was completely quiet, but the conjunctiva had a dull and lusterless surface with much shrinking.

ALLING.

DARIER (39, **Value of gonococcic vaccine for purulent ophthalmia in adults**) reports a case of gonorrheal ophthalmia in an adult which seems to have been rapidly controlled by the use of dmegon, a gonococcal vaccine. Argyrol and irrigations were employed locally as usual.

SCHOENBERG.

FERNANDEZ (40, **Conjunctivitis of the fornix**) calls attention to a condition of the fornix characterized by non-inflammatory swelling and protrusion due to serous infiltration. It seems to be quite frequent in Cuba and has often been mistaken for trachoma. Blood examinations do not show the patients to be anæmic, but the extreme heat and debility incident to life in the tropics are evidently factors to be considered.

ALLING.

KERSHNER (41, **Ætiological factors in an epidemic of acute conjunctivitis at Camp Sherman**) gives the following results of the bacteriological examination of twelve hundred cases of this disease. Pneumococcus, 37.5%, staphylococcus, 6%; meningococcus 1.5%; Koch-Weeks, 2.5%; Morax-Axenfeld, 3.5%; organisms undetermined, 9%; no organisms, 40%.

ALLING.

SANTO FERNANDEZ (42, **Is trachoma curable?**) says that his ophthalmological experience of more than forty years teaches him to say that the diagnosis of trachoma cannot be made most

of the time unless the disease has progressed far enough to show characteristic complications. He does not believe that trachoma is curable.

SCHOENBERG.

Various reports of the successful treatment of this refractory affection have appeared from time to time in literature. SHUMWAY (43, **Vernal conjunctivitis greatly improved by radium treatment**) adds another marked case in which nearly a complete cure was brought about after six applications. He thinks that 25 to 35*mg* should be used for a period of fifteen minutes at intervals of from two to four weeks. Inflammatory reaction may be prevented by suitable protection of the adjoining parts.

ALLING.

VAN SCHEVENSTEEN (44, **Hyaline degeneration of the caruncle and tarsal conjunctiva in an old trachoma patient**) describes a peculiar lesion that consisted of a flat, cartilaginous swelling, occupying the region of the caruncle and the inner third of the tarsal conjunctiva of both eyelids of the left eye. The removal of this swelling and its microscopic examination revealed a hyaline degeneration of the tissues involved.

SCHOENBERG.

XII.—THE CORNEA.

45. TILLOT, E. **Traumatic ulcerative keratitis, complicated by iritis, successfully treated with dionin.** *La clinique ophtalmologique*, viii., 8.

TILLOT (45, **Traumatic ulcerative keratitis successfully treated with dionin**) reports a case of this nature. The condition was due to an accidental introduction of a small quantity of powder of stanniferous chloride into the conjunctival sac of one eye. The immediate irrigation of the eye did not prevent the development of a violent keratitis and iritis which showed no trace of improvement for twenty-four days, in spite of the faithful treatment with atropine, adrenaline, cocaine, iodoform, and hot applications. Finally instillations of dionin acted like a specific, the cornea and iris cleared up in a few days and the vision improved from counting fingers to normal.

SCHOENBERG.

XIII.—THE IRIS.

46. BICHON, A. **Colloidal sulphur for rheumatic manifestations in the eyes.** *La clinique ophtalmologique*, viii., 7.

47. FEINGOLD, M. **Essential atrophy of the iris.** *American Journal of Ophthalmology*, February, 1918.

48. SHANNON, C. E. G. **Two cases of congenital coloboma of iris and choroid.** *Ibid.*, January, 1918. *Transactions American Ophthalmological Society*, 1917.

BICHON (46, **Colloidal sulphur for rheumatic manifestations in the eye**) reports five cases of rheumatic iritis which were treated with atropine, hot applications, and colloidal sulphur injected intravenously or intramuscularly, and is satisfied that the addition of this drug hastened recovery to a considerable degree.

SCHOENBERG.

FEINGOLD'S (47, **Essential atrophy of the iris**) patient, a woman of 37, gave a history of left convergent strabismus and, six months before seen, an attack of severe pain with impaired vision on the left side. The attacks of pain returned and the vision was lost. The pupil was eccentric and irregular. The iris was light brown as was the other eye, but was blurred. There were several black areas in the ciliary region where the details were absent. Some of these areas consisted of a layer of brownish black pigment impervious to light, others were holes.

Tension of the eye was 38*mm*. The eye was enucleated on account of pain. The iris angle was found obliterated and the dark areas observed clinically were seen to be true holes, others to consist of pigment. Blood-vessels were very numerous in the ciliary region but in the sphincter portion were very thin and scanty. In the temporal side of the retina cell-like bodies appeared which were considered to be ganglion cells having undergone degeneration, this view being strengthened by the absence of ganglion cells in the retina affected. The optic nerve showed typical cupping and on the temporal side an area in which the fibers are absent—so-called cavernous degeneration of Schnabel. The conclusions are that there was a congenital defect in the smaller arterial circle and that toxins were set free by destruction of the iris tissue producing changes in the other structures of the eye. ALLING.

SHANNON (48, **Congenital coloboma of iris and choroid**) in his report describes two cases associated with microphthalmos and convergent strabismus. Investigation of the family revealed the fact that the father and two sisters were similarly affected as well as a brother and sister of the father. This report confirms the opinion that hereditary influences are potent in the production of the anomaly.

ALLING.

XIV.—THE LENS.

49. BARRAQUER, J. A. **A few indications for phacoerisis.** *La clinique ophtalmologique*, viii., 7.

50. COLIN, A. **The simple extraction of cataract with suture of the corneal flap.** *Annales d'oculistique*, cliv., 8.

51. PAINE, H. S. **Operation for the extraction of lenses fully dislocated into the vitreous.** *American Journal of Ophthalmology*, March, 1918.

BARRAQUER (49, **A few indications for phacoerisis**) recommends the intracapsular extraction of all except the membranous cataracts. He has met no difficulties and has extracted the lens in capsule in a variety of complicated cases, like retinitis pigmentosa, high myopia, iridocyclitis, chorio, retinitis, and one with a foreign body in the lens. Posterior synechiæ are no contraindication for the use of the suction method for the extraction of the lens, and the rupture of the zonula Zinn did not cause loss of vitreous.

SCHOENBERG.

COLIN (50, **The simple extraction of cataract with suture of the corneal flap**) gives a detailed description of this method, as practised mainly by Kalt and Chevallereau on several hundred patients and discusses its ad- and disadvantages. The main advantages are: (1) Iridectomy is unnecessary; (2) the coaptation of the lips of the wound is better and more rapid than that obtainable by the classical method; (3) vitreous is never lost; (4) it is not necessary to operate on both eyes and the patient may be allowed to sit up very soon after the operation. The disadvantages are: (1) frequent occurrence of iris prolapse; (2) difficulty of technique. The method is not indicated in young patients with soft cataracts and is contraindicated in patients with unclean conjunctivæ.

SCHOENBERG.

PAINE (51, **Operation for the extraction of lenses fully dis-**

located into the vitreous) suggests the use of a strong light focused on the eyeball to illuminate the interior so that the lens may be seen and be more readily extracted by means of a hook. He relates five cases in which this method was successfully employed.

ALLING.

XV.—THE CHOROID.

52. OPIN. **Benignant tumor of the choroid.** *Annales d'oculistique*, cliv., 12.

53. VAN SCHEVENSTEEN. **A case of retinochoroiditis complicating spirochetosis ictero-hemorrhagica.** *Ibid.*, cliv., 12.

OPIN (52, **Benignant tumor of the choroid**) found in an eye enucleated for iridocyclitic glaucoma a tumor of the choroid which consisted of a proliferation of connective tissue and was diagnosed by pathologists as "œdematous fibroma," possibly myxoma. The tumor was the size of a large shot and was located midway between the ora serrata and the optic disk. The author found no case similar to the present one in literature.

SCHOENBERG.

VAN SCHEVENSTEEN'S (53, **Retinochoroiditis complicating spirochetosis ictero-hemorrhagica**) patient, a soldier (age not given), was recovering from an attack of spirochetosis ictero-hemorrhagica when he developed a patch of chorioretinitis in his left eye followed by a similar condition in his right eye a few weeks later. The urine became albuminous at the same time. It required two months for the vitreous opacities to disappear and the chorioretinal patches to begin to be absorbed. In three other cases of spirochetosis ictero-hemorrhagica observed by the author; no fundus changes were discernible and the vision was not affected.

SCHOENBERG.

XVI.—SYMPATHETIC OPHTHALMIA.

54. MORAX, V. **Sympathetic uveitis.** *Annales d'oculistique*, cliv., 7.

55. MORAX, V. **Clinical and statistical notes on sympathetic ophthalmia in the armies.** *Ibid.*, cliv., 12.

56. POULARD, A. **Sympathetic ophthalmia.** *Ibid.*, cliv., 12.

57. POULARD, A. **Abnormal sympathetic ophthalmia.** *Ibid.*, cliv., 12.

58. VAN SCHEVENSTEEN, JR. **Sympathetic ophthalmia.** *Ibid.*, cliv., 8.

MORAX (54, **Sympathetic uveitis**) is convinced that sympathetic ophthalmia is due to an infective agent. He has made microscopic examinations of all the eyes enucleated by him and several others during the war and found changes absolutely characteristic in those affected by this disease. These changes consist of a diffuse or nodular lymphocytic infiltration of the choroid. The retina shows very mild lesions or none. The point of entrance of the infective agent is usually in the region of the posterior pole (usually introduced by a foreign body lodged in the choroid). Some rare cases are due to injuries of the iris and ciliary body. SCHOENBERG.

MORAX (55, **Clinical and statistical notes on sympathetic ophthalmia in the armies**) has collected thirty-nine histories of all the cases of sympathetic ophthalmia which occurred during this war in the French army. Thirty-one were due to projectiles, four to accidents, three were post-operative, and one followed an ulcer of the cornea. Abscission of the prolapsed iris, covering of the wound with a conjunctival flap, amputation of the anterior portion of the globe, evisceration, and even enucleation do not always prevent the occurrence of sympathetic ophthalmia, even when done immediately after the injury has taken place. Since a period of at least fourteen days always passed between the injury and the appearance of the first symptoms of sympathetic ophthalmia, the very important conclusion is to be drawn that enucleation can prevent this complication only if performed within two weeks after the injury. Evisceration does not offer a safe preventive measure, since Dr. Kalt has seen a case of sympathetic ophthalmia following an evisceration performed four days after the injury. The period of incubation varied in the thirty-nine cases between fifteen days and two years. As to the clinical types observed there were thirty-one cases with the classical appearance of iridochoroiditis and eight which began as an optic neuritis and choroiditis. The outcome as to the vision was as follows: twelve ended in complete blindness; one remained with V. = $\frac{1}{10}$; one committed suicide; twenty had V. = $\frac{5}{10}$ to $\frac{1}{18}$ and five had V. = $\frac{5}{10} - \frac{4}{10}$.

SCHOENBERG.

POULARD (56, **Sympathetic ophthalmia**) says that preventive enucleations against sympathetic ophthalmia are a super-

fluous maiming since this disease's occurrence is of extreme rarity. In war injuries whenever enucleation is necessary, removal of the anterior portion of the eyeball answers the purpose and has the great advantage of furnishing a better support for an artificial eye.

SCHOENBERG.

POULARD (57, **Abnormal sympathetic ophthalmia**) reports the history of the single case of sympathetic ophthalmia he has seen in this war. The unusual feature about this case is that the sympathetic ophthalmia developed in the left eye four months after the enucleation of the right eye, injured five weeks previously.

SCHOENBERG.

VAN SCHEVENSTEEN (58, **Sympathetic ophthalmia**) publishes the history and pathological examination of the first case of sympathetic ophthalmia developed from a war injury in France. The clinical evolution was characteristic and the microscopic changes consisted of a lymphocytic infiltration, diffuse in some parts, nodular in others, found only in the uvea. The retina remained intact. He believes that the statistics of sympathetic ophthalmia in this war cannot be written for many years, since many an injured eye may give rise to this complication in some future time.

SCHOENBERG.

XVII.—GLAUCOMA AND INTRAOCULAR TENSION.

59. GIFFORD, HAROLD. **Glaucoma from the absorption of senile cataract.** *American Journal of Ophthalmology*, February, 1918.

60. MAGITOT, A. **The physiological intraocular pressure.** *Annales d'oculistique*, cliv., 5, 6, 7.

61. PARENTAU. **The homeopathic treatment of glaucoma.** *La clinique ophtalmologique*, viii., 8.

62. PARKER, W. R. **The management of cases of non-inflammatory glaucoma classified as simple anterior and simple posterior glaucoma.** *American Journal of Ophthalmology*, September, 1918.

GIFFORD (59, **Glaucoma from the absorption of senile cataract**) has seen ten cases of spontaneous absorption of cataract. In three useful vision resulted and he thinks that the others would have terminated satisfactorily except for the intercurrence of glaucoma. It has been supposed by former observers that the glaucoma or some inflammatory complica-

tion was the cause of the cataract absorption, but he is of the opinion that glaucoma is the result. His theory is that toxic products incidental to degeneration of the cortex produce the glaucoma or that possibly it may result from the escape of cortical matter into the anterior chamber. He does not see how a freely movable nucleus in the liquid cortex can produce irritation.

ALLING.

PARENTAU (61, **The homeopathic treatment of glaucoma**) says that the medical means of treating chronic glaucoma by allopaths are very limited in number and that the homeopaths have a great variety of drugs which give better results. He recommends the use of very weak (homeopathic) dilutions of eserin and pilocarpin for local applications and atropin, cocain, caustic potash, and phosphor in homeopathic doses taken internally. Four histories of cases with glaucoma are given to illustrate his contentions.

SCHOENBERG.

If the posterior lymph spaces of the eye are blocked the lens and iris will be pushed forward, whereas with interference with the anterior drainage they will remain in the normal position. Classifying the cases on this basis PARKER (62, **Management of cases of non-inflammatory glaucoma classified as simple anterior and simple posterior glaucoma**) thinks that an iridectomy will relieve the circulation in the anterior variety but that in the posterior it is of no avail. The trephine operation looks toward establishing a filtration cicatrix which permits the fluids of the eye to pass and would be indicated if the posterior channels were involved. All cases of simple glaucoma which can be classified as anterior, with the exception of those with narrow fields, should be treated with iridectomy, while all cases of posterior glaucoma as well as those with contracted fields should be trephined. These suggestions are based upon clinical observations and verified by examinations of pathological specimens.

ALLING.

From a critical study of the literature MAGITOT (60, **The physiological intraocular pressure**) draws conclusions, some of which are entirely at variance with the current ideas on this subject. The ocular tension depends to some degree upon the

general blood pressure, but the eyes possess an auto-regulatory apparatus which counteracts the effect of high blood pressure. The factors determining the ocular tension are: (*a*) The general circulation; (*b*) the local circulation (in the eye); (*c*) the walls of the eyeball. The uvea plays the most important rôle in determining the ocular tension. This is an erectile tissue composed almost exclusively of blood-vessels and on its more or less active state of engorgement depends the ocular tension. The uvea contains nerve-fibers and cells of sympathetic origin with a vasomotor function. The variations of blood pressure produce certain changes in the ocular tension. The decrease of blood pressure is followed by a proportionate lowering of the ocular tension, but the high blood pressure does not produce a marked increase of tension in the eyeball. On the other hand the ocular tension is very intimately related with and depends upon the local, uveal circulation. Artificially induced hyperæmia of the uvea is followed by an increase of tension. The cervical sympathetic has a regulatory influence upon the uveal circulation and thereby upon the ocular tension, but far greater is the influence of the peripheric sympathetic, consisting of nerve-fibers and cells situated in the uvea, upon the ocular tension. This ocular sympathetic center is mainly responsible for all the physiological as well as pathological variations of the ocular tension.

The aqueous humor has nothing to do with the ocular tension. It is not—as almost everybody believes—continually secreted and excreted. Its function is mechanical, and provides a water cushion to the tissues surrounding it.

The ocular tension depends only upon the state of engorgement of the uveal blood-vessels and this is regulated by the vasomotor innervation supplied by the uveal sympathetic.

SCHOENBERG.

XVIII.—THE RETINA AND VITREOUS.

63. APPLEMAN, L. F. **Massive spontaneous hemorrhages into the vitreous.** *American Journal of Ophthalmology*, January, 1918.

64. BURKHOLDER, C. A. **Hole in the macula.** *Ibid.*, February, 1918.

65. JENNINGS, J. E. **Aneurysms of the retinal arteries.** *Ibid.*, January, 1918.

66. LLOYD, R. I. **Blocking of macular arterioles as a cause of central and paracentral scotoma of the macular bundle.** *Ibid.*, June, 1918.

67. ROCHON-DUVIGNEAUD, A. **The functions of the rods and cones as indicated by comparative physiology.** *Annales d'oculistique*, cliv., 11.

APPLEMAN (63, **Massive spontaneous hemorrhages into the vitreous**) reports three cases of extensive hemorrhages into the vitreous. One he thinks was due to septic absorption from a pyorrhea. The other patients were syphilitic. Causes which have been assigned to this type are alteration in the blood circulation, change about puberty, and local vascular disease due to various systemic diseases among which are syphilis and tuberculosis.

ALLING.

BURKHOLDER (64, **Hole in the macula**) found a circular excavation in the macular region slightly larger than the disk. It was about 1*mm* deep and had a sharply marked pigmented border. The floor was a mottled deep red color and there were a few cholesterin crystals in the base and surrounding retina. When a boy, the patient had received a severe blow on the eye and was totally blind for a few days.

ALLING.

JENNINGS (65, **Aneurysms of the retinal arteries**) found in the left eye of his patient, a young man of 21, a normal optic nerve but in the macular region a large collection of white dots. The retinal veins in some places were twice their normal size and in others reduced to threads. At different places in the arteries were eighteen aneurysms, the larger ones having a bright central reflex. There were also numerous hemorrhages. The other eye was normal.

ALLING.

LLOYD'S (66, **Blocking of macular arterioles as a cause of central and paracentral scotoma of the macular bundle**) case complained of sudden dimness of vision, and he found ædema of the retina extending in a curve from the disk to the macula. A permanent scotoma corresponding to this area remained, and he thinks the condition one of block of the inferior macular artery. The defect is best shown with a chart from the stereoscopic campimeter.

ALLING.

ROCHON-DUVIGNEAUD (67, **The functions of rods and cones as indicated by comparative physiology**) has studied microscopic sections of retinæ of reptiles and confirms the findings of

Max Schultze who, as far back as 1866, found that the retina of diurnal animals contains more cones and that of nocturnal ones mostly rods. Rochon-Duvigneaud has found that the chameleon has a retina containing exclusively cones and that the nocturnal lizard has the retina provided only with rods. Not only the structure of the retina, but also the entire conformation of the eye gives a clue as to the diurnal or nocturnal character of the animal. For instance the eye of the chameleon has an extremely small cornea, the pupil is very small, round, and is immobile to light mydriatics and myotics. Death or experimental destruction of the brain does not change the size of its pupils. These eyes represent the extreme type of visual organs adapted for daylight only. The structural composition of the retina, in the region of the fovea centralis, with its extraordinary abundance in very small cones, must give an almost microscopic visual acuity to this animal. The eye of a nocturnal lizard, on the other hand, presents a number of characteristics peculiar to nocturnal vision; a large cornea, an oval, large pupil, reacting very promptly to the slightest variations of intensity of light, an absence of fovea centralis, consequently no central vision. SCHOENBERG.

XIX.—THE OPTIC NERVE.

68. BANE, W. C. **Cyst of the dural sheath of the optic nerve.** *American Journal of Ophthalmology*, January, 1918.

69. LENOIR, M. **Acute, infectious retrobulbar neuritis.** *Annales d'oculistique*, cliv., 7.

BANE'S (68, **Cyst of the dural sheath of the optic nerve**) patient was a boy of six years who was blind in the left eye with the nerve atrophic. There was also a marked exophthalmos and limitation of motion. An X-ray showed no sinus involvement or tumor. The operation was performed by severing the external rectus and securing it with a suture, then dissecting backward close to the eyeball. A smooth round mass was disclosed firmly attached to the sclera about the nerve entrance and enveloping the nerve itself. The cyst was ruptured and a clear fluid escaped. About 11*mm* of the nerve with the cyst wall was removed from its attachment to the globe. The cyst was probably derived from the pial and arachnoidal sheaths of the optic nerve. ALLING.

LENOIR (69, **Acute, infectious retrobulbar neuritis**) reviews the well-known symptoms and pathogeny of the acute retrobulbar neuritis and expresses his belief that syphilis, rheumatism, and multiple sclerosis have nothing to do with this condition. He doubts even whether posterior ethmoiditis and sphenoiditis play an important and frequent rôle in its causation. As the most probable cause of retrobulbar neuritis he accepts the old idea of Parinaud, namely that it is due to an extension of a meningitis to the macular bundle of the optic nerve.

SCHOENBERG.

XX.—ACCIDENTS, INJURIES, AND PARASITES.

70. FRIEDENWALD, N. **Luxation and evulsion of eyeball during birth.** *American Journal of Ophthalmology*, January, 1918.

71. HECKEL, E. B. **Whip-cracker injury of the eye.** *American Journal of Ophthalmology*, July, 1918.

72. LUNA, P. **Disturbances of vision in patients harboring certain filarial tumors.** *Ibid.*, February, 1918.

73. POSEY, W. C. **Injury to the eyes from lightning stroke.** *Ibid.*, February, 1918.

FRIEDENWALD (70, **Luxation and evulsion of eyeball during birth**) has collected twenty-nine cases of this sort from literature. He was called to see a child one and a half hours after birth and found the left eye completely luxated through the lids. It was necessary to enlarge the palpebral fissure before the eye could be returned. When seen two years later the eye was to all appearances normal.

ALLING.

HECKEL (71, **Whip-cracker injury of the eye**) reports three cases in which a small piece of fine brass wire entered the eye from the cracker of a whip. In one the foreign body was in the cornea and anterior chamber. In another the X-ray showed it to be in the posterior vitreous, while the third was imbedded in the posterior sclera. The first was removed, the second left in situ as enucleation was refused, and the third was found in the enucleated eye. In snapping a whip the lash must attain a very high velocity for the bit of wire to strike the eye with sufficient force to penetrate the sclera.

ALLING.

LUNA (72, **Disturbances of vision in patients harboring certain filarial tumors**) has observed eye lesions in patients

suffering from a disease known in Central America as Coast Erysipelas and caused by a parasite not exactly identified. He found superficial punctate keratitis complicated by a plastic iritis. The disease usually results in blindness. Another manifestation is amblyopsis without discoverable lesion which he thinks is due to toxins produced by the parasite.

ALLING.

POSEY (73, **Injury to the eyes from lightning stroke**) has seen two cases of this sort. The first was a boy who was rendered unconscious by a stroke of lightning and whose face and hair were burned. The upper lid of one eye was reported to have been œdematous, the pupil small, and he suffered from photophobia. The fundus showed retinal œdema but no detachment or hemorrhages. The vision was not recorded. When seen by Posey the eye was quiet and projection good. He did a cautious needling; there was a cataract but results not recorded. The second case was blinded in a similar way and when seen a month later could only count fingers. There was œdema of both retinæ and the nerves were hyperæmic and blurred. After another month the eyes returned to normal.

ALLING.

BOOK REVIEWS.

I.—**Glaucoma.** A textbook for the student of Ophthalmology. By Col. ROBERT HENRY ELLIOT. 158 illustrations, pp. 546. H. K. Lewis & Co., London. P. B. Hoeber, 67 East 59th Street, New York, 1918. Price $7.50.

A comprehensive work on the present state of our knowledge of glaucoma is surely timely, and no one is better fitted to give an authoritative critique of the voluminous literature on this subject than Colonel Elliot. Very wisely the ground is first cleared by an exact definition of the terms which are so often vaguely used in discussing the problems connected with glaucoma. After a brief description of the anatomy of the structures of the eyeball affected in glaucoma, the various factors are reviewed whose function is to regulate intraocular pressure. It is shown that the contents of the eye are not fixed and alterations in pressure are compensated for by definite methods, and that the tunics of the eye are not rigid. There is a difference, though slight, between the two divisions of the aqueous chamber and the pressure in the vitreous must be necessarily still higher, otherwise no flow could take place. The eyeball is not a closed chamber but one through which fluid is constantly passing, making the problem one of hydrodynamics and not one of hydrostatics. The production of intraocular fluid is both a pressure filtration and a secretion. Rise of general blood-pressure does not generally affect intraocular pressure. Fluid leaves the eye from the anterior chamber by osmotic action in which Thomson's pump action (*The Ophthalmoscope*, vol. ix., 1911, p. 470) is an important factor.

In the chapter on Etiology, the pathological anatomy is first described. Schnabel's theory of cavernous atrophy of the optic nerve is regarded as fantastic, though it served to draw attention to the cases of continuance of optic atrophy after the

primary cause of that atrophy is removed. The writer believes that the continuation of the optic atrophy in cases where trephining was apparently successful, is due to an associated autogenetic autointoxication; the optic nerve is primarily damaged by glaucoma and cannot resist the attacks of autogenetic poison. It has occurred to the reviewer that some toxic process of this kind must be assumed in the cases of glaucoma with central scotoma which are not infrequent; at the same time the search for this factor has not been successful. The hydrophyllic theory (Fischer's œdema from acidosis) is dismissed because of weakness of evidence. According to the author, the evidence in favor of the closure of the iris angle being causative of the rise in intraocular pressure is overwhelming. The decisive factor in determining the onset of glaucoma is the size of the eye relative to that of the lens it contains, and in the chronic cases changes in the size and position of the lens are the most important ones. In the causation of glaucoma the writer (p. 99) lays stress upon the fact that it may be due to (1) an interference with the balance normally held between secretion and excretion in the eye, or (2) an obstruction to the escape of blood from the eye, or (3) a combination of these influences.

The chapter on Diagnosis of glaucoma begins with the clinical manifestations of the various forms and a description of the signs and symptoms from an anatomical standpoint. In discussing (p. 175) the ophthalmoscopic changes the writer says that the usual cup may be absent and the cupped part be limited to the center,—in other words, incomplete; this later goes on to a complete cup and in the preglaucomatous stage a central circular physiological cup would be present. Cupping may exceptionally imitate a physiological excavation and confusion may arise when a nerve-head with a deep physiological cup undergoes simple atrophy. The field examination is carefully gone into (small and large object perimetry) with due attention to recent important investigations, such as Bjerrum's screen, Roenne's nasal step, Bjerrum's sign, and Seidel's sign (paracentral scotoma). The value of the Schiotz tonometer is fully granted, though the writer thinks its most important rôle is rather as a means to watch the progress of a case and to control our success in combating the rise of intraocular ten-

sion. A diminution in the differential light sense is an early symptom and should receive further investigation.

The various forms of secondary glaucoma are then taken up. Intumescent cataract as a cause was frequent in the author's Madras experience. Treatment consists in preliminary iridectomy followed by extraction as soon as the eye has quieted down. A posterior sclerotomy may be necessary before the iridectomy. Glaucoma following the needling of an after cataract was a condition especially studied by Herman Knapp, who found that it was always relieved by an iridectomy. In the reviewer's opinion, the condition results from a sudden mixture of vitreous and aqueous interfering with the normal outflow from the eye and a simple paracentesis is sufficient to relieve the condition. In iridocyclitis with increased tension, if antiphlogistic measures do not avail, Elliot advises the use of atropin boldly with preparation to proceed surgically if the tension be increased.

Buphthalmos, the congenital variety of glaucoma, is fully described; the outcome in spontaneous detachment of the retina and subsequent phthisis is not mentioned, though this possibility must be kept in mind before operating. Trephining offers the best chance from an operative standpoint, which is practically the only one. In its performance it is not necessary to split the cornea, as the conjunctiva strips back off the cornea to an unusual distance. The writer says the possibility of congenital syphilis must never be forgotten in these cases.

Unfortunately, no adequate description is given of "glaucoma simplex," that well-defined form of glaucoma which occurs in older patients and is characterized by optic atrophy out of proportion to the shallow cupping, by a very much contracted field, and by tonometric readings generally within the upper limit. This is the variety of glaucoma, if it be glaucoma, upon which a fistulizing operation exerts no favorable influence.

As for treatment, the author recognizes the importance of general treatment and massage of the eye, but does not take a particularly favorable view of the results to be obtained from miotic treatment. The danger of a rise in tension occurs during sleep (p. 367), and the writer therefore suggests the instilla-

tion of a drop the last thing at night. This is not in accord with the experience of some oculists as it is a common experience for sleep to control a glaucomatous attack.

The question of operation, and when to operate, is then taken up. The author believes that in this his belief must be shared by all, that the earlier the operation the better the result, and that iridectomy can only be effective in early cases where the angle of the anterior chamber is not blocked; after this stage an operation for the formation of a filtering scar must be done. It is in connection with the last group that the author describes the newer operations for glaucoma. This important part of the book deals with the history of these operations, with preparations for operation, and a description among other operations of Lagrange's operation and particularly of the author's operation (sclerocorneal trephining).

The technique for trephining is most exhaustively entered into; each step is carefully analyzed and the reasons for its performance given. A *2mm* instrument is preferred, principally to give room enough to deal satisfactorily with impaction of the iris; the size of the opening can be reduced by cutting off any desired portion of the disk. If the iris does not present, the writer believes it to be better to leave it alone. After the iridectomy, the iris is replaced best with an irrigator. The complications or accidents occurring during the performance of the operation, the after-treatment, and the late complications are fully described. Late infections can be practically avoided, in the writer's opinion, by the use of "thick flaps."

In an appendix the author's scotometer is described, a device combining the advantages of Priestley Smith's revolving scotometer with those of the Bjerrum screen.

This book is a mine of information even to the experienced oculist, besides being a scientific and practical exposition of glaucoma in all its phases. It should serve to remedy the many errors which occur so frequently in the management of these desperate cases. Operations which successfully cause a fistulization are an enormous step in advance in the treatment of glaucoma, and in this progress Colonel Elliot's name will always be preëminent.

A. K.

II.—**Hygiene of the Eye.** By Dr. W. CAMPBELL POSEY, Philadelphia. 344 pages. 120 illustrations. Publishers, J. B. Lippincott Co., Philadelphia, 1918.

It is quite in line with the attention that is now being given to preventive medicine that there should be a book on Hygiene of the Eye. The author, Dr. Posey, has wisely selected experts to write on the physical problems which constitute so important a part of the subject; Artificial Lighting is treated by Herbert E. Ives, and Daylight Illumination of rooms and buildings from an architectural standpoint is by W. C. Farber. These chapters contain valuable information on subjects which are attracting more and more attention, and whose importance is gradually being realized. After a simple description of the anatomy and physiology of the eye and of the ophthalmoscope, the refractive errors and strabismus are treated in an elementary, though perfectly comprehensive, way. The various systemic disturbances which accompany these conditions are described and much sound advice is found in the chapter on School Life and Care of Eyes. In the clinical part, the Diseases of the Conjunctiva, Eyelids, Choroid, Retina, Optic Nerve and the subjects of Cataract and Glaucoma are briefly discussed. The important relation of the Eye to General Disease is the subject of the next chapter. Under Wounds and Injuries the author gives an excellent account of the Industrial Injuries of the Eyes. Finally a chapter on the Blind, their education and employment, by O. H. Burritt, and one on Conservation of Vision by E. M. Van Cleve, conclude the volume.

The information which Dr. Posey has collected must appeal to a wide circle of readers. The subject matter is presented in an unusually clear and readable manner. Some of the individual topics are essential to the general practitioner, teacher, social worker, and to the laity in general. The subjects of lighting, industrial injuries, the blind, and the conservation of vision should be of particular interest to the oculist, as they are the work of specialists and represent expert opinion on subjects of great importance to the community, and about which the desired information is not always easy to find. The book is excellently printed on dull paper and the illustrations in black and white are well chosen. A. K.

III.—**Concerning Some Headaches and Eye Disorders of Nasal Origin.** By Dr. GREENFIELD SLUDER. St. Louis. Pp. 270. C. V. Mosby & Co., 1918.

Following Dr. A. E. Ewing's suggestion that certain asthenopias are due to nose conditions not yet fully understood, the author was led to study the nasal factor in headaches and in eye lesions. The proper interpretation of the underlying pathological features belongs to Dr. Jonathan Wright. These consist in chronic inflammatory changes which begin in the soft parts and then cause bone changes either as bone absorption or as bone forming. Grave symptoms result when sensitive nerves or nerves of special sense are affected. Avoiding the self-evident paranasal sinus suppuration, the author describes three varieties of nasal disease or of clinical pictures which have as symptoms, headache and some eye disorder: (1) closure of the frontal sinus without suppuration; (2) the syndrome of nasal ganglion neurosis; (3) the picture of hyperplastic sphenoiditis.

1. In the first group, closure of frontal sinus without suppuration, the patients only have eye symptoms. The air in the sinus is absorbed, negative pressure makes the walls sensitive. The eye symptoms are those of asthenopia. This subject was presented by Ewing and Sluder before the American Ophthalmological Society in 1900. There is a tender point in the upper inner angle of the orbit, at the pulley and interior and just posterior to it (Ewing's sign). The rhinologist's findings are usually negative. The tugging of the superior oblique on this wall causes the pain. Sluder has seen 580 cases. Treatment consists in the application of astringents or the removal of the middle turbinal.

2. Nasal ganglion neurosis: The spheno-palatine ganglion is located in the spheno-maxillary fossa which is in intimate relation to the nose and paranasal cells. The spheno-palatine foramen lies just posterior to the tip of the middle turbinal. The ganglion is 1 or 2 to 9*mm* from the nose. The ganglion can be involved in posterior ethmoidal and sphenoidal suppuration or directly from the nose. The symptoms are those of a coryza followed by pain of a neuralgic type at the root of the nose, about the eye, upper jaw, and teeth, extending back to a point 5*cm* back of the mastoid and down to the arm

and shoulder, or the symptoms are those of the sympathetic type with vasomotor and secretory phenomena, severe sneezing, nasal congestion and thin discharge, congestion of the conjunctiva, lacrymation, dilatation of pupil, "stary look," photophobia, etc. These symptoms are relieved after cocainizing the ganglion. Injections of this ganglion have cured blepharospasm, corneal ulcer, relieved the severe pain of uveitis, glaucoma, interstitial keratitis, etc. Ewing found that the pain of glaucoma could be stopped in this way, and Miller and Luedde observed transitory lowering of tension in glaucoma.

3. Hyperplastic sphenoiditis: In the anatomical introduction the author shows that the 2d and 3d divisions of the V. nerve and the Vidian nerve are usually well removed from the sphenoid sinus, in fact the VI. nerve and the 3d branch of the V. nerve are the only ones not at times in close relation with this cell, unless it is prolonged into the greater wings or backward. The sphenoid sinus may even come in close relation to the semilunar ganglion. In the sphenoidal fissure the II.,VI., and ophthalmic nerves are separated from the sphenoidal cavity by thin bone. The author believes that a large number of the frequently recurring headaches usually called migraine are of sphenoidal origin. The eye changes are retrobulbar neuritis, transitory amblyopia, choroiditis, ocular palsies (III., IV., and VI. nerves) which are of the type of ophthalmoplegic migraine, cyclitis, and ophthalmic migraine. After removal of the anterior wall Holmes's naso-pharyngoscope shows thickening of membrane, localized inflammation, polypi, etc. Optic nerve disorders are frequently caused by hyperplastic bone changes in the sphenopostethmoidal region, preceded in a large percentage by headache. This bone process, a periostitis, narrows the bone canals through which the respective nerves pass. Sphenoidal lesions affect the oculomotor and abducent nerves more frequently than any of the other nerves in the sphenoidal fissure, though even these are infrequent.

The diagnosis of hyperplastic sphenoiditis and the author's operation for the "upper cells" are carefully considered.

A number of case histories conclude the book and illustrate, among others, the following eye conditions of interest to the

oculist, which were observed in connection with nasal lesions: Vacuum frontal headache, blindness from sphenoiditis, blepharospasm and lacrymation, dilated pupil, paralysis of accommodation, ophthalmoplegic migraine, III. and VI. nerve paralyses, migraine, optic neuritis, tic, iritis, photophobia, transitory amblyopia, choroiditis, glaucoma.

The direct relation of the eye condition to the sinus disease in these cases is not always definite, principally because the description of the eye changes is not complete. This does not lessen the gratitude which oculists owe to Dr. Sluder for again drawing attention to the important interrelation of the eye and nose, and for his noteworthy contributions on this subject. Of particular interest are Dr. Sluder's original investigations on the nasal ganglion, especially its influence on the eye, such as the relief of pain in uveitis and in glaucoma after cocainizing this ganglion. A. K.

IV.—**Fractures of the Orbit and Injuries to the Eye in War.** By FELIX LAGRANGE, Bordeaux. Translated by Herbert Child. Edited by J. Herbert Parsons. Pp. 248. 77 illustrations and 6 plates. Univ. of London Press, Ltd., London. Masson & Cie., Paris, 1918.

This is a translation of one of the volumes in the "Horizon" collection, the French series of war manuals.

After an historical introduction on fractures of the orbit by war projectiles, the orbital cavity is considered with reference to conformation, resistance to injury, and vulnerability. Fractures of the orbit occurred in 609 cases out of 2554 wounds inflicted in war which were observed in the author's service. Of these 609 the eyeball was destroyed in 212; the eyeball was preserved in 397, without any ocular lesion in 105 and with ocular lesions in 292. These lesions were chorioretinitis, atrophic and pigmented, 94, chorioretinitis proliferans 45, detachment of retina 40, vitreous hemorrhage 31, optic atrophy 29, optic neuritis 22, section of optic nerve 12, cataract 7, corneal lesions alone 6, laceration of optic nerve 4, subluxation of lens 2.

In addition, the adjoining nasal sinuses and the brain were involved in 154, the sensory nerve in 43, muscles 27, lacrymal passages 25, cellulitis of orbit 2.

The fractures of the orbit were practically always direct and the eyeball, though preserved in about ⅔ of the cases, was usually affected in one of the following ways: (*a*) The eyeball itself is not involved but its nerves and vessels are injured; (*b*) concussion injury of the eye; (*c*) a projectile grazing the eyeball without rupturing it or forcing the eye against the bony wall of the orbit, causes damage at the bruised point, ruptures of the choroid and retina, with detachment of the retina, often accompanied by macular changes. Actual cases are reported with an anatomical sketch of the projectile's path. The condition differs according to the retention or absence of foreign body. The concussion injuries are usually macular lesions without any other apparent injury to the eyeball. According to the author, the eye is shaken like a submerged boat when struck by a deep wave and the macular region is affected because it is the most fragile and because traction is localized to the posterior pole held back firmly by the optic nerve. The author even speaks of a clinical law: concussion of the eye without direct shock = macular and perimacular lesion. Larger choroidal lesions are ruptures caused by greater violence, and are always situated on the side of the orbital fracture. A remarkable injury is the tearing out of the papilla by sudden stretching of the optic nerve. After the blood has absorbed, the fundus picture shows torn vessels and a deep excavation due to rupture of the sclerotic. Hematoma of the nerve sheath has been observed in a number of cases with great probability though no histological examinations were available. Ophthalmoscopic signs of ischæmia or peripapillary hemorrhage were never observed, though after some time a brownish pigmented ring appeared around the disk.

Under cataract, two cases of lens opacity are reported which resulted from the shock of aerial waves on the eyeball from proximity to the explosion of a shell. The opacities were star-shaped, posterior, polar, and later became complete. Proliferating retinitis is always the result of hemorrhage. Rupture of the choroid and retina are followed, if small, by atrophic and pigmented chorioretinitis; if accompanied by considerable hemorrhage, by proliferation. Traumatic enophthalmos is described together with the observation of three new cases

without adding anything to the knowledge of this curious affection.

Twenty-four ophthalmoscopic drawings in black and white illustrate the various forms of fundus changes observed in these fractures, showing hemorrhages, chorioretinal changes, ruptures, and proliferations.

Under treatment of ocular complications, sympathetic ophthalmia is first discussed. This occurred in 5 of 2554 injuries to the eyeball. Lagrange states that photophobia, lacrymation, fatigue in reading, and diminution of sight are the first degree of this affection, of which serous iritis is the second degree and iridocyclitis is the third. If an eye contains a foreign body and still has useful sight, it should be left alone. If it no longer has vision and if the foreign body is in the ciliary region, the eye should be enucleated even if there is no pain or irritation. If the foreign body is elsewhere and the eye is quiet, it can be left; if it is reduced in tension, slightly tender, and its nutrition is visibly suffering, the eye should be removed. The author recommends the following procedure for treating detachment of the retina. It consists in creating in the region of the canal of Schlemm beneath the conjunctiva cicatricial tissue obliterating the filtration spaces. This is alone indicated in hypotonic, relaxed eyes, otherwise treatment consists in subconjunctival salt injections, atropin, bandage, and prolonged rest in bed. Of 135 cases, complete recovery was observed in three, improvement in eight. A chapter on reparative surgery of the orbit by means of adipose and cartilaginous grafts concludes the book. A. K.

V.—**Atlas d'Ophtalmoscopie de Guerre.** By Professor FELIX LAGRANGE, Bordeaux. Text in French and English. 100 plates of which 20 are in colors. Masson et Cie., Paris, 1918.

Ophthalmoscopic changes occur in war with much greater frequency than one would at first expect, as, in addition to the more usual injuries, commotion of the air and contusions of the bones of the face surrounding the orbit are often followed by changes in the eye grounds. These changes were so frequent that the author was led to collect his observations in an atlas. The drawings were made by an artist, Camille de Buzon, with the aid of the Thorner and the Gullstrand ophthalmoscopes.

The cases studied are arranged in the following six groups: I. Lesion of the inner membranes by concussion at a distance; II. Lesions of the optic canal; III. Macular and paramacular lesions by concussion of the facial bony structures, not directly involving the orbit; IV. Concussion changes at posterior pole, peripheric lesion by contact from a missile passing through orbit; V. Lesions of inner membranes by a missile injuring them behind the eyeball; VI. Lesions of the inner membranes in contusion of the eyeball. Of particular interest are the intraocular changes following a concussion of the neighborhood, an original observation of Lagrange which was first published on May 15, 1915. The lesions are choroidal, subretinal ruptures, hemorrhages followed by complete reabsorption or by the formation of more or less bulky pigmentary deposits. These changes always occur at the posterior pole as has been explained in "Fractures of the Orbit" (see preceding review). Similar changes at the macula are observed after direct injury to the eyeball.

Each plate is accompanied with a brief history of the case it illustrates, a diagram of the course of the projectile, and a report of the fundus condition, thus furnishing a complete clinical picture. The drawings in black and white convey an adequate impression of the fundus changes while the ones in color are excellent. This collection of war pictures is a most valuable contribution to clinical ophthalmoscopy, and throws a new light upon many fundus changes which are occasionally seen in ordinary hospital work.

A. K.

VI.—**Les Borgnes de la Guerre** (The One-eyed in War). By Dr. G. VALOIS of Paris. Pages 236, many illustrations. Publishers, Masson et Cie., Paris, 1918.

In the introduction it is stated that the frequency of ocular injuries is much greater than in any previous war, though sympathetic ophthalmia has been rare. Enucleations were frequent; one surgeon estimated this operation to be 60% of those performed on the eye.

The difficulty of inserting the artificial eye depends upon abnormality or irregularity of the cavity. In peace times it is simple enough to form more or less identical orbital cavities

after enucleation,—in other words, the preparation for the artificial eye is comparatively simple and often consists in a partial operation, such as exenteration or amputation of the anterior segment. In the war wounds conditions, however, were entirely different.

The desire for motility, appearance, and prominence of the artificial eye has led to complete enucleations with grafts of living substance and with muscular reinsertion. To obtain a good cosmetic result a cavity has to be prepared to hold the artificial eye in a good position. There must be a surface or a stump sufficient to support the artificial eye, and, second, the artificial eye must fit well.

The development of a proper cavity is aided by the insertion of a provisional body which consists of polished ebony of the form of a half olive, and is slightly curved. A cross on the anterior surface indicates the proper axis. This splint should be applied directly after the operation; it will then show the condition of the eyelids, the form of the cavity, and the dimensions of the cul-de-sac. It makes the suture of the eyelids whenever necessary very much more easy, giving them the form which is desired. It also prevents deformities and post-operative adhesions. Whenever enucleation is done in cases where there is a discharging fistula from the depth, it is of advantage to have a fenestrated olive which will permit drainage.

The orbital cavity presents the following lesions: cicatricial bands, cicatricial contractions, partial or complete symblepharon. The bands usually start from the surface wound, usually of the eyelids. A fibrous tract unites the two opposing walls and the mucous membrane projects. The new-formed scar is dense, all elasticity of the region is lost and no movement is permitted. Sometimes it is connected with an opening in the deeper parts of the orbit. In other cases a band will form a bridge crossing the cul-de-sac placed between the length of the eyelid and of the orbit. In order to relieve any of these cicatricial bands, there is only one operation which is of value, and that consists in making a large incision along the outer orbital margin about 3 or 4*cm* long, detaching the one eyelid from the other. A suture is passed through each eyelid, and using them as retractors, the lids are separated. Then with the scissors, the conjunctiva can be dissected free from the

underlying cicatricial tissue, and the various cicatricial bands can be thoroughly excised. The margins of the lids are freshened and sutured after the olivary piece has been inserted. It is best to leave the orbit in this condition for about three months before separating the two eyelids.

If the cavity is too small, Coulomb has obtained good results by gradual dilatation with the use of olive-shaped splints of increasing size. In fact the wearing of one of these splints exerts a good action upon the shape of the cavity.

The cavity may be contracted by scars of the conjunctiva following injuries to the orbit. The restoration of these cavities by surgical means is often deceiving as the procedure is a difficult one and the results are inconstant. In general, there is one principle and that is that the only means of enlarging the cavity is by the addition of new tissue. This is obtained either by the use of cutaneous flaps taken from a distance or by pedunculated flaps from the adjoining region by twisting its peduncle or crossing the outer canthus. In general the cutaneous graft is used. This varies in thickness from the entire thickness of the skin to only a superficial part.

As to the support of the artificial eye, the atrophic eyeball can only serve if there is not the slightest suspicion of a possible sympathetic irritation, though these are the eyes which give the best support to the artificial eye. In general, particularly after war injuries, it is necessary to enucleate. As far as possible, it is well to preserve the integrity of the conjunctival sac and not to disturb the insertion of the motor apparatus, so that its function will be restored. Unfortunately, simple enucleation is the least advantageous for a prothesis which has but little motility and exhibits an unsightly depression over the upper lid, as the muscles are irregularly united in a central scar and the contraction of one muscle causes a deformation rather than a movement. Hence we endeavor to keep open Tenon's capsule by the insertion of costal cartilage, by a round piece of skin, decalcified bone, or a piece of sclera. The selected graft then serves for a point upon which the tendons will act. To prevent the tendons from becoming united several authors have sutured each muscle to the overlying conjunctiva to conserve the anatomic relationship.

Ocular stumps are obtained without enucleation by am-

putation of the anterior segment, optico-ciliary neurectomy, and exenteration of the eyeball. The first gives excellent cosmetic results, though it can only be applied in a limited series of cases. Optico-ciliary neurectomy has been abandoned. Exenteration gives a very simple method of treating wounds of the eye. Its safety from sympathy depends upon the complete removal of choroidal tissue. This is sometimes done more easily than in others, at the same time it does not give an absolute safeguard against sympathy. The resulting cosmetic results, comparing enucleation and exenteration, are distinctly in favor of exenteration. Mules recommended the insertion of a glass ball. This has been generally abandoned on account of the many failures and the more or less great reaction which has followed this procedure. An important point has been brought up by Dor, who found that in the later results the eyes which have been subjected to enucleation give very much less trouble than those in which a substitute operation has been done.

The rigid surface is supplied by a scleral graft, according to a special method of Valois, which is as follows: The four tendons of the recti muscles are first isolated and sutured to the overlying conjunctiva before a tenotomy is performed. The enucleation then follows as usual. A scleral flap is then taken from the posterior surface of the enucleated eyeball. This has the shape of a lozenge 2½ by ½*cm*. At each extremity of this graft four doubly armed sutures are inserted. The graft is then placed in Tenon's space with its convexity forward. It is fixed by passing the sutures through the overlying conjunctiva and then united. It is well to insert the sutures as far away from the conjunctival margin as possible. This increases the extent of the movements of the artificial eye; finally, the conjunctiva is carefully sutured.

The rest of the book deals with the preparation of the artificial eye and with the "prothèse postiche orbito-palpébrale."

A. K.